The National Flood Insurance Program: An Annotated Bibliography

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Acronyms

ASFPM	Association of State Floodplain Managers
BPAT	Building Performance Assessment Team
CAC	Community Assistance Contact
CAP	Community Assistance Program
CAV	Community Assistance Visit
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resources System
CRS	Community Rating System
CTP	Cooperating Technical Partners
DFIRM	Digital Flood Insurance Rate Map
DHS	Department of Homeland Security
EO	Executive Order
FEMA	Federal Emergency Management Agency
FHBM	Flood Hazard Boundary Map
FIA	Federal Insurance Administration
FIMA	Federal Insurance and Mitigation Administration
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
FmHA	Farmers Home Administration
FY	Fiscal year
GAO	General Accounting Office
GIS	Geographic Information Systems
GFIP	Group Flood Insurance Policy
HMGP	Hazard Mitigation Grant Program
HUD	Department of Housing and Urban Development
ICC	Increased Cost of Compliance
IFGP	Individual and Family Grant Program
LOMA	Letter of Map Amendment
LOMR	Letter of Map Revision
MMP	Map Modernization Plan
MPPP	Mortgage Portfolio Protection Program
NCUA	National Credit Union Administration
NEMIS	National Emergency Management Information System
NFIP	National Flood Insurance Program

NFIRA	National Flood Insurance Reform Act of 1994
OAM	Office of Acquisition Management, FEMA
OGC	Office of the General Counsel, FEMA
OIG	Office of Inspector General, FEMA
OMB	Office of Management and Budget
ORA	Office of Risk Assessment, FEMA
OTS	Office of Thrift Supervision
PA	Public Assistance
PL	Public Law
SBA	Small Business Administration
SFHA	Special Flood Hazard Area
SFIP	Standard Flood Insurance Policy
TVA	Tennessee Valley Authority
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WYO	Write Your Own

Abernathy, Ann Marie and Leslie Weiner. (1995). Evolving federal role for emergency relief. *Forum for Applied Research and Public Policy*, 10(1), 45-8.
Keywords:
disaster assistance, history, legislation
Abstract: The evolving philosophy, activities, and responsibilities of FEMA are outlined from the first federal law to authorize funding for disaster relief enacted in 1950 to proposed legislative amendments in 1994. Originally assisting with natural disasters such as earthquakes and floods, FEMA has come to provide assistance with technological, human-made, and natural catastrophes today. FEMA's emphasis on hazard mitigation shows a focus on consequences of disasters and emergencies. Internal agency improvements to increase federal responsiveness and efficiency are described.

Alabama Emergency Management Agency. (1999). *Floodplain Management in Alabama: Local Officials Reference Manual.* Clanton, AL: Alabama Emergency Management Agency.
Keywords:
Alabama, Community Rating System, compliance, development, enforcement, federal programs, Flood Mitigation Assistance Program, floodplain management, Hazard Mitigation Grant Program, mapping, mitigation, NFIP, substantial damage, substantial improvement, variances
Abstract: This guidebook is intended to aid local building, planning, zoning and code enforcement officials engaged in enforcement of the NFIP through explanations and examples of the NFIP's requirements. The guidance outlines the minimum requirements for participating in the NFIP and offers recommendations for optional higher standards. Additionally, the handbook gives information specifically related to floodplain management in Alabama. Chapter topics include flood hazard maps, standards for floodplain development, permit issuance, inspection, enforcement and compliance, variances, roles and responsibilities of local officials, suggestions for improving floodplain management and an introduction to related programs and objectives. Related programs and objectives include the Community Rating System (CRS), Flood Mitigation Assistance (FMA) Program, the Clean Water Act, and open space preservation. Appendices include technical information, state and federal contact information, and a glossary of terms.

All-Industry Research Advisory Council. (1989). *Surviving the Storm: Building Codes, Compliance and the Mitigation of Hurricane Damage*. Oak Brook, IL: All-Industry Research Advisory Council.
Keywords:
Hurricane Hugo, compliance, mitigation, enforcement, building codes, hurricanes, insurance coverage, insurance industry
Abstract: Hurricane Hugo brought into focus a need to look at how states, municipalities, building code officials, builders, architects, and insurers might work together to lessen damage from hurricanes. This study reports on the increase in people and property at risk from hurricanes along the Gulf and Atlantic Coasts. It also reviews evidence on how the strength of local building codes and the level of compliance have made a difference in the amount of damage sustained in recent hurricanes. The report analyzes the wide variations in building codes in effect along the Gulf and Atlantic Coasts, and highlights states and organizations that have paid special attention to wind resistance requirements in building codes. Cost implications of stronger wind resistance requirements for construction of new homes are explored. Finally, the study contains a summary of comments made by coastal building officials and inspectors about the challenges of

improving enforcement of and compliance with wind resistance provisions in building codes. One major finding indicates that property values exposed to hurricane losses along the Atlantic and Gulf Coasts increased 64 percent from 1980 to 1988.

American Geological Institute. (2000). ***Natural Hazards Mitigation and Insurance Update*****. Washington, DC: Government Affairs Program, American Geological Institute.**
Available at: http://inet2.agiweb.org/agi/gap/legis106/mitigation.html
Keywords:
Stafford Act, mitigation, legislation
Abstract: On October 30, 2000, President Clinton signed H.R. 707, the Disaster Mitigation and Cost Reduction Act, into law (P.L. 106-390). The law amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act to require that states submit a detailed, comprehensive state program for emergency and disaster mitigation prior to receiving funds from FEMA. The law requires FEMA to hold a public comment period before adopting new or modified policies that may result in a meaningful change in the amount of assistance a state or local community may receive.

American Geological Institute. (2002). ***Natural Hazards Mitigation Policy*****. Washington, DC: Government Affairs Program, American Geological Institute.**
Available at: http://inet2.agiweb.org/agi/gap/legis107/mitigation.html
Keywords:
Stafford Act, mitigation, legislation
Abstract: This document reviews the recent legislation relating to natural hazards mitigation. It focuses on the legislative bottleneck the precluded new legislation from amending the Stafford Act. Two flood-related exceptions to the bottleneck were a disaster mitigation pilot program within the Small Business Administration and a law requiring states to submit detailed, comprehensive state programs for emergency disaster and relief before receiving funds from FEMA.

American Society of Civil Engineers. (2000). ***Reducing Flood Losses through the International Code Series: Meeting the Requirements of the National Flood Insurance Program*****. Washington, DC: FEMA in cooperation with International Code Council, Building Officials and Code Administrators International, International Conference of Building Officials, Southern Building Code Congress International, Inc., Association of State Floodplain Managers, and the American Society of Civil Engineers.**
Available at: http://www.fema.gov/pdf/hazards/report-all.pdf
Keywords:
floodplain management, International Code Series, building codes
Abstract: This guide's purpose is to help community officials decide how to integrate the 2000 edition of the International Codes (I-Codes™) for building safety into their current floodplain development and regulatory processes. The I-Codes™ contain provisions that meet the minimum flood resistant design and construction requirements of the NFIP. The guide neither endorses any specific approach nor does it explain the NFIP requirements and how to administer them. Chapter 1 includes an overview of the NFIP, community and state responsibilities under the NFIP, the benefits of participation in the NFIP, and the implications of not participating. Chapter 2 reviews approaches to floodplain management, noting that integrating a community's approach

with the I-Codes™ involves planning to reduce overlap of regulations, duplications of effort, and conflicts. Worksheets are provided to help communities assess how their current approaches to regulating development compare to the NFIP's requirements and to facilitate decisions. Chapter 3 discusses the implications of adopting the I-Codes™ in terms of development other than buildings and structures, on-site utility systems, NFIP's Community Rating System, building code amendments for consideration by communities that choose higher standards, requirements for handling substantial improvement and repair of substantial damage, and the provision of "Increased Cost of Compliance" coverage for substantially damaged buildings. Chapter 4 reviews community responsibilities under the NFIP, including record keeping, permits, notification requirements, flood hazard map-related duties, elevation certificates, inspections, enforcement and violations, and the variance process.

Anderson, Dan R. (1974). The National Flood Insurance Program: Problems and potentials. *Journal of Risk and Insurance*, 16(4), 579-99.
Keywords:
communication, marketing, NFIP
Abstract: The National Flood Insurance Act of 1968 provides for subsidized flood-insurance and seeks to reduce long-term flood damage through land-use and other control measures. The floods of 1972 and 1973 provided early tests of the program, and it appears to have been deficient in many respects. The author examines these deficiencies and offers reasons for their existence. Ameliorative actions that were taken and others that have been proposed to improve the program are analyzed. Finally, the lessons learned from this study are used to postulate guidelines for improving existing and future government-industry programs. These guidelines include the use of modern marketing techniques, adequate incentives for salesmen, commitment from management, and measuring demand for the product.

Anderson, Dan R. (2000). Catastrophe insurance and compensation: Remembering basic principles. *CPCU Journal*, 53(2), 76-89.
Keywords:
insurance
Abstract: This publication reviews the basic principles for insurance as it relates to catastrophe insurance. The author concludes that the current systems for insurance and compensating property damages caused by natural disasters, including floods, are flawed by endemic problems. The severity of the problems has grown over 25 years in conjunction with increasing catastrophe-related property damage. A review of the problems (increased frequency and severity of events, rapid population of properties in high risk areas) and recommendations for new/alternative approaches are described, including a return to fundamental insurance principals.

Anselmo, V., G. Galeati, S. Palmieri, U. Rossi, and E. Todini. (1996). Flood risk assessment using an integrated hydrological and hydraulic modeling approach: A case study. *Journal of Hydrology*, 175, 533-54.
Keywords:
modeling, hydrology and hydraulics, risk assessment, Italy
Abstract: This paper describes an integrated hydrological and hydraulic modeling approach for the risk assessment of a flood-prone area and its application to analyzing the effects of extreme flood events on the Montalto di Castro thermoelectric power plant. The approach is based on

four major steps. The first step entails a detailed analysis of available critical events as well the collection of hydro-meteorological and cartographic data to perform a statistical evaluation of extreme rainfall events and an estimation of the probable maximum precipitation (PMP). The second step involves the calibration of a rainfall-runoff model for the upper catchment area based on the data observed during a recent flood event. The third step involves the calibration of a two-dimensional hydraulic model for simulating floodplain inundation using the previously reconstructed runoff and a comparison of the results with the maximum flood levels observed during the same event. The final step concerns the simulation by the two-dimensional hydraulic model of the flood wave obtained via the rainfall-runoff model using the extreme and PMP values of rain redefined in the first step. The results of this approach appear to be extremely useful and easily transferable to other areas.

Armstrong, John M. and R. Bruce Denuyl. (1977). An investment decision model for shoreland protection and management. *Coastal Zone Management Journal*, 3(3), 237.
Keywords:
property values, erosion, coastal areas, cost-benefit analysis
Abstract: The article presents an investment decision model for problems associated with shoreline erosion. The model determines the economic benefits that a landowner can realize from available alternative protection structures. Benefits are estimated from erosion-induced property value decline for specific reaches of shoreline. This approach enables the decision-maker to determine the local economic impact of alternative shore land management policies. The economic effects of coastal management policies, such as nonstructural shore land protection, wetlands regulation, and public beaches, are discussed in terms of the model's ability to evaluate and compare the opportunity cost of alternative policies. Finally, the article presents and discusses computational examples of the model output.

Association of State Floodplain Managers. (1984). *Improving the Effectiveness of Floodplain Management in Western State High-Risk Areas: Alluvial Fans, Mudflows, Mud Floods*. Boulder, CO: Natural Hazards Research and Applications Information Center, University of Colorado.
Keywords:
alluvial fans, mudflows, mud floods, risk assessment, mitigation, mapping, insurance coverage, insurance claims, Arizona, Oregon, Nevada, California
Abstract: This report summarizes the papers and discussions of a workshop to investigate approaches for improving the effectiveness of floodplain management in alluvial fan, mudflow, and mud flood areas. Participants in the workshop agreed that problems caused by alluvial fans and mud floods in the fast-growing areas of the West and Southwest were too serious to delay new initiatives until the completion of methodological research and the development of detailed maps. Reasonable actions including encouragement of local and state governments to exceed minimum NFIP standards, improved performance standards for land use, and increases in rates for flood insurance can and should be under consideration. Additional research to perfect methods of assessing risk and techniques of mitigating hazards should take place simultaneously. FEMA should provide leadership in such efforts, but other federal agencies should also contribute technical assistance and knowledge. Participants also recommend the encouragement of state and local governments to assume enhanced roles.

Association of State Floodplain Managers. (1987). ***Reducing Losses in High Risk Flood Hazard Areas: A Guidebook for Local Officials.*** **Washington, DC: FEMA.**
Keywords:
risk management, risk assessment, mitigation, development, alluvial fans, ice jams, dams, erosion, levees, subsidence, mudslides, coastal areas
Abstract: This document provides guidance to local officials in their efforts to reduce flood losses in areas of high risk. It is designed to identify general areas where special risks are posed to life and property due to the depth, velocity, and duration of flooding, debris in the water or other factors; describe a process for amending existing regulations or adopting new regulations for areas of high risk; and provide examples of innovative local programs and approaches for areas of high risk. Chapter 1 gives an overview of nine types of areas of high risk: areas behind unsafe or inadequate levees, areas below unsafe or inadequate dams, coastal flooding and erosion areas, flash flood areas, subsidence and liquefaction, fluctuating lake levels, ice jams, and mudslides. Chapter 2 explains the importance of managing areas of high risk and describes general options and steps for improving their management. Chapters 3 through 11 provide description and guidance for managing development in areas of high risk. The appendices contain examples of ordinances, regulations, guidelines, and descriptions of local programs.

Association of State Floodplain Managers – Flood Insurance Committee. (1992). ***ASFPM Flood Insurance Promotion Survey*****. Madison, WI: Association of State Floodplain Managers.**
Keywords:
marketing
Abstract: This report is the result of a survey of ASFPM membership to determine what is being done to promote the sale of flood insurance and recommend guidelines based on the responses. The majority of respondents cited flood threats as the primary basis for promoting the sale of flood insurance. Slightly less than half of the respondents used a campaign approach to increase public participation.

Association of State Floodplain Managers – Flood Insurance Committee. (1992). ***ASFPM Insurance Data Survey*****. Madison, WI: Association of State Floodplain Managers.**
Keywords:
communication
Abstract: The purpose of this survey is to evaluate the distribution of data on insurance policies from FIA to the states. The survey was initiated partly in response to complaints about the timeliness of communication between states and FIA. The survey asked state NFIP coordinators about the frequency and format of information they receive. Fifty-two percent of the responding states felt that they were not receiving the information on a regular basis and 80 percent felt that the information was necessary to the operation of the state NFIP program.

Association of State Floodplain Managers and the Federal Interagency Floodplain Management Task Force. (1996). ***Addressing Your Community's Flood Problems: A Guide for Elected Officials.*** **Madison, WI: Association of State Floodplain Managers.**
Keywords:
floodplain management, mitigation, disaster planning, disaster assistance, flood disaster planning, federal programs

Abstract: This guide provides a point-by-point discussion on how elected officials should prepare for and recover from flooding in their communities. Successful preparation for a flood should involve understanding the local flood problem and floodplain and building support by promoting floodplain management. After a flood has occurred, a community has a number of resources at its disposal. Elected officials should know how to access those resources for the benefit of the community. The guide also includes a checklist of measures for addressing a community's flood problems and information on mitigation and sources of outside assistance.

Association of State Floodplain Managers. (1996). *Coast to Coast: 20 Years of Progress*. Proceedings of the Twentieth Annual Conference of the Association of State Floodplain Managers, San Diego, CA, June 10-14, 1996. Madison, WI: Association of State Floodplain Managers.
Keywords:
floodplain management, public policy, mitigation, coastal areas, hydrology and hydraulics, modeling, mapping, building codes, Flood Mitigation Assistance Program, urban areas
Abstract: *Coast to Coast: 20 Years of Progress* is divided into 12 parts: national policy and programs; multihazard mitigation; multi-use watercourses; local planning and management for flood mitigation, coastal hazard mitigation, hydrology and hydraulics; modeling and computer programs; mapping; precipitation, gauging, forecasting, and warning; stormwater management; construction techniques, building, performance, and data collection; and planning for, using, and maintaining structures for loss reduction. Relevant contributions to this anthology include: (a) Michael Davis' "New Directions for the Corps of Engineers Water Resources Programs," which emphasizes the need for both developing strong partnerships with state and local governments and supporting nonstructural approaches to mitigation; (b) Shirley Mattingly's "Mitigation and Partnerships for Floodplain Management," which states that the creation of the Flood Mitigation Assistance Program will lead the way for the creation of a pre-disaster mitigation program; (c) Bernard Scheff and Kenneth Nacci's "Floodplain Management in Urban Redevelopment: A Case Study in Multiple Objective Management," which presents the flood control project at Arcadia Creek as a case study to show how multiple objectives of urban development could be effectively achieved; (d) David Knowles and Peter Richardson's "The Zone A Crunch," which highlights the increasing demand for better mapping, particularly with increased enforcement of mandatory purchase by banks; (e) William Weaver's "Urban Stormwater Regulations: A Worthy Opponent to Development-Induced Flooding," which concludes that since the late 1970s, urban regulations have been important in reducing the impact of urbanization on flood conditions; and (f) Frank Thomas' summary of the conference. Thomas identifies the inherent policy conflicts between land-use and mitigation and emphasizes the need to build closer working relationships within a multigovernmental, multihazard, and multidisciplinary framework.

Association of State Floodplain Managers. (1996). *Floodplain Management 1995: State and Local Programs.* Madison, WI: Association of State Floodplain Managers.
Keywords:
floodplain management, Unified National Program, compliance
Abstract: This report provides a complete national summary of the practice of floodplain management at the state and local levels. Most of the information presented in this report was obtained through a questionnaire mailed to the NFIP coordinator in each of the 50 states, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands. Supplemental information was

obtained from various federal, state, local, and private resources, and other published material. The report begins with a discussion of the roles played by the state and local levels of government, then describes some broad activities they undertake. The middle part of the report is organized around the Unified National Program's framework of strategies and tools. The last chapter summarizes the changes in the field over the last three years (or more, when earlier comparable data are available) and notes both statewide and national trends.

Association of State Floodplain Managers – Flood Mitigation Committee. (1996). ***Use of Benefit/Cost Analyses to Evaluate the Elevation of Substantially Damaged Structures.*** **Madison, WI: Association of State Floodplain Managers.**
Keywords:
cost-benefit analysis, floodplain management, substantial damage, mitigation
Abstract: This report comments on the use of benefit/cost analyses for the elevation of substantially damaged buildings with FEMA funds. In 1996, FEMA issued a policy memorandum waiving the requirement for a benefit/cost analysis in the acquisition of substantially damaged buildings, except in coastal areas. ASFPM solicited comments on the issue from federal, state, local, and private-sector floodplain managers. Arguments in favor of requiring a benefit/cost analysis focus on the position that limited mitigation funding can be put to better use than in projects that do not provide an equitable return in damage prevented. Supporters of waiving the requirement for a benefit/cost analysis cite a variety of efficiency and consistency issues. According to the NFIP, elevating substantially damaged buildings proves cost-effective in a majority of cases. However, some respondents believe devoting resources to benefit/cost analyses on a project-by-project basis wastes resources, interferes with other planning considerations, and probably has minimal impact on projects.

Association of State Floodplain Managers. (1997). ***Floodplain Management in a Multifaceted World.*** **Proceedings of the Twenty-first Annual Conference of the Association of State Floodplain Managers, Little Rock, AR, April 28-May 2, 1997. Madison, WI: Association of State Floodplain Managers.**
Keywords:
floodplain management, public policy, Hurricane Fran, coastal areas, hydrology and hydraulics, mapping geographic information systems, mitigation, Army Corps of Engineers
Abstract: *Floodplain Management in a Multifaceted World* is divided into 13 parts: national policy and programs; state and local planning and management for flood mitigation; watershed management; coastal issues; lessons from Hurricane Fran; hydrology and hydraulics; mapping; using structures for loss reduction; using geographic information systems; protecting and using floodplain resources; evaluating environmental projects, international approaches; and the practice of floodplain management. James Lee Witt, Director of FEMA, summarizes the agency's initiatives, in particular those involving buyouts, mapping, and communication. He also announces an ASFPM-FEMA cooperative project to develop an academic fellowship for floodplain management. Michael Davis, Deputy Assistant Secretary of the Army for Planning, Policy, and Legislation, concludes that integrated policies are possible and that the choice between flood protection and environmental protection does not have to be made. Dennis Mileti argues that the traditional perspective in dealing with natural disasters has flaws because it focuses on a hazard-by-hazard approach. He defends a more holistic view of hazards. Gilbert White argues that the next challenge for floodplain management is to find ways to create a fresh

approach to floodplain management by incorporating the whole range of concepts. Robinson et al. present the Army Corps of Engineers' new cost-effectiveness and incremental-cost analysis software called ECO-EASY. Hansen et al. discuss the research on environmental planning at the Corps of Engineers. They point out that the Corps initiated the Evaluation of Environmental Investments Research Program (EEIRP) in 1993 to provide Corps planners with methods and techniques to develop feasible projects under a limited budget.

Association of State Floodplain Managers. (1999). ***Mitigation Success Stories in the United States*****. Madison, WI: Association of State Floodplain Managers.**
Keywords:
mitigation, Hazard Mitigation Grant Program, Flood Mitigation Assistance Program, Alabama, Colorado, Delaware, Georgia, Illinois, Maryland, Minnesota, Missouri, Montana, North Dakota, South Dakota, Wyoming
Abstract: Local, state and federal floodplain managers and emergency managers constantly work to reduce or eliminate the effects of natural hazards in communities nationwide. Efforts to achieve and implement mitigation techniques, approaches, and successes have been actively underway in the United States for over two decades. The Hazard Mitigation Grant Program (HMGP) and the Flood Mitigation Assistance (FMA) Program represent the primary funding sources for many of the projects described in this report. In addition to presenting examples of activities to mitigate the effects of natural hazards, the report publicizes the benefits of mitigation successes across the nation. These examples should serve as models for future projects and provide decision-makers with valuable information about how to formulate, undertake, and ultimately achieve natural hazard reduction at the local level.

Association of State Floodplain Managers. (1999). ***Planning Ahead: Reducing Flood Losses in the 21st Century*****. Proceedings of the Twenty-third Annual Conference of the Association of State Floodplain Managers, Portland, OR, May 24-28, 1999. Madison, WI: Association of State Floodplain Managers.**
Keywords:
floodplain management, mitigation, environmental policy, compliance, enforcement, hydrology and hydraulics, modeling, geographic information systems, mapping, insurance, federal programs, urban areas
Abstract: *Planning Ahead: Reducing Flood Losses in the 21st Century* is divided into 13 parts: local projects and programs for planning, mitigation, acquisition, and recovery; watershed management; protecting and restoring natural and cultural resources in floodplains; community assistance for the NFIP; techniques and projects in stormwater management; hydrologic forecasting; flood modeling, GIS and simulations; flood hazard mapping; special flood-related hazards; international approaches to floodplain management; flood insurance; and federal programs, policies, and initiatives. Relevant contributions include: (a) Peterson et al.'s "Reducing Flood Losses Through Floodprone Land Acquisition: Identifying Total Costs and Benefits," which analyzes the flood-prone land acquisition program (FLAP) initiated by Pima County, AZ, in 1984 to offer property owners, who had either lost their homes or sustained severe damage, the option of selling their property to the County rather than rebuilding at the same location (although the County later expanded the program to include the acquisition of underdeveloped properties and parcels in upper watershed areas); (b) Burrell Montz and Graham Tobin's "The Effectiveness of the NFIP in Two Communities: Syracuse, NY, and Tampa, FL,"

which obtains a preliminary view of the impact of the NFIP on the development of urban floodplains; (c) Mark Boyer's "Coming Full Circle: Using the NFIP to Prevent At-Risk Development in Flood-Prone Lands," which argues that the NFIP may well represent the best mechanism for achieving no new building in areas prone to flooding; and (d) Michael Scheffler's "Flood Risk Assessment and Mitigation - An Insurance Company's Approach," which suggests that floodplain managers need to ally with and draw on the insurance industry's network of loss-control engineers. The author believes insurers, floodplain managers, and the public need access to the organized data sets used in FEMA's studies of flood hydrology and hydraulics. Schleffer also considers it essential to reverse cutbacks on funding in the US Geological Survey's stream gage program, which provides critical data to quantify and direct changes in flood risk.

Association of State Floodplain Managers. (1999). ***Times are Changing: Flood Mitigation Technology*****. Proceedings of the Twenty-second Annual Conference of the Association of State Floodplain Managers, Milwaukee, Wisconsin, May 18-22, 1998. Madison, WI: Association of State Floodplain Managers.**

Keywords:
floodplain management, compliance, enforcement, mitigation, Community Rating System, geographic information systems, hydrology and hydraulics, coastal areas, mapping, buyouts, environmental policy, public policy, substantial damage, erosion, training, modeling

Abstract: *Times are Changing: Flood Mitigation Technology* is divided into 14 parts: national policy and programs; state and local planning, management, and projects for flood mitigation; applying GPS, GIS, and other technology; coastal issues; mapping: program issues, applications, and new technology; acquisition; stream protection and restoration; flood damage estimation; post-flood activities; building performance and standards; program and policy evaluations and issues; professional activity in floodplain management; stormwater management and watershed management; and hydrology and hydraulics. Relevant contributions to this anthology include: (a) Michael Armstrong's "Thirty Years of the National Flood Insurance Program," which discusses the program's accomplishments, challenges, and opportunities; (b) David A. Stroud's "The NFIP's Community Rating System: A Proactive Approach to Mitigation Planning," which describes the process of planning as a component of participating in CRS; (c) Sue Hoegberg's "FEMA's New Digital Flood Insurance Rate Map Data Plans," which explains FEMA's proposal to create two new types of DFIRMs to meet the needs of floodplain management; (d) Miriam G. Anderson et al.'s "A New Urban Revival: Floodplain Acquisition in Lawrence, Massachusetts," which outlines a project to acquire and demolish flood-prone structures in a densely developed, post-industrial city; (e) Marshall Mabry et al.'s "Local Floodplain Administrator Training During Post-Flood Recovery," which summarizes efforts to train local floodplain administrators for work in the post-disaster environment; and (f) Rose Austin et al.'s "Community Profiling of the National Flood Insurance Program: A Quantitative Analysis of Local Programs," which gives the details of a study undertaken by FEMA to assess the ability of local communities to administer and enforce the requirements of the NFIP by interviewing local floodplain managers. FEMA records the responses and uses them to develop a profile of the community.

Association of State Floodplain Managers. (2000). ***Floodplain Management 2000 and Beyond: A New Beginning in a New Millennium*****. Proceedings of the Twenty-fourth Annual Conference of the Association of State Floodplain Managers, Austin, TX, June 18-23, 2000. Madison, WI: Association of State Floodplain Managers.**

Keywords:
floodplain management, compliance, enforcement, mitigation, modeling, mapping, Project Impact, Hazard Mitigation Grant Program, environmental policy, public policy, Army Corps of Engineers, coastal areas, hydrology and hydraulics, geographic information systems, repetitive losses, erosion, HAZUS
Abstract: *Floodplain Management 2000 and Beyond: A New Beginning in a New Millennium* is divided into 13 parts: sustainable floodplains—ideas, plans, projects, and programs; regional approaches to planning and management; experiences in and techniques for local floodplain management; local mitigation plans and activities; preserving and restoring natural and cultural benefits of floodplains, acquisition programs; stormwater management; coastal issues; flood and precipitation estimation and prediction; mapping flood hazards; applying new technology to floodplain management; modeling and its applications; and nationwide perspectives, policies, and programs. Relevant contributions to this anthology include: (a) Melanie Sattler and Jack Tidwell's "Going Above and Beyond the National Flood Insurance Program to Truly Stabilize Flood Risks: The Corridor Development Certificate Process," which explains how 11 communities in north central Texas have implemented an innovative program of permitting structures in the floodplain known as the Corridor Certificate (CDC) process; (b) Frank Pagano et al.'s "Comprehensive Community Assessment Visit Pilot Project," which discusses the use of a pilot project to assess community compliance in four highly flood-prone jurisdictions in Texas and Louisiana; (c) Rachel Beer and Jennifer L. Lefort's "Amite River Basin Flood Hazard Mitigation Plan," which reports on a flood hazard mitigation plan developed for the Basin and intended to assist residents minimize losses and damages caused by flooding; (d) John Randolph and David Saha's "Recommendations for Improving FEMA's Hazard Mitigation Grant Program for Buyout Projects," which offers recommendations for improving certain arduous aspects of applying for funds through HMGP; (e) Steve Dunn's "Coastal Erosion: Economic Impacts and Implications for Public Policy," which reports on a study on coastal erosion conducted by the Heinz Center; and (f) Mark A. Riebau's "Technical Mapping Advisory Council: Recommendations for the 21st Century," which provides an overview of activities undertaken by the Technical Mapping Advisory Council and encourages Congress to fund the Map Modernization Plan (MMP).

Association of State Floodplain Managers. (2000). *Mitigation Success Stories III*. Madison, WI: Association of State Floodplain Managers.
Keywords:
mitigation, Hazard Mitigation Grant Program, Flood Mitigation Assistance Program, Alabama, Colorado, Connecticut, Delaware, Georgia, Illinois, Maryland, Minnesota, Mississippi, Missouri, Montana, North Dakota, Pennsylvania, South Dakota, Texas, Utah, Wyoming
Abstract: One of the primary goals of local, state, and federal floodplain managers and emergency managers is to reduce or eliminate the effects of natural hazards such as flooding, hurricanes, tornadoes, winter storms, wildfires, etc. in communities nationwide. The third edition of this report profiles 40 projects from 17 states in order to publicize the benefits of hazard mitigation. Each profile describes project benefits, costs, and funding sources.

Association of State Floodplain Managers Inc. (2000). *National Flood Programs in Review—2000: Summary*. Madison, WI: Association of State Floodplain Managers.
Keywords:

floodplain management
Abstract: This study examines national floodplain management policies and programs and identifies improvements that would help secure sustainable floodplain lands and disaster-resilient communities for the future. The study identifies five areas in which ASFPM will focus over the next several years: (a) fostering responsibility and capability at the individual, local, and state levels; (b) refining policies, programs, and coordination to build on existing strengths and remedy deficiencies; (c) assembling and improving the data and tools that are vital to wise floodplain management; (d) enhancing education, training, and public awareness; and (e) assessing and evaluating programs so that the appropriate lessons can be learned from them.

Association of State Floodplain Managers. (2000). ***The Nation's Responses to Flood Disasters: A Historical Account.*** **Madison, WI: Association of State Floodplain Managers.**
Keywords:
floodplain management, history
Abstract: This document examines the forces and events that have shaped floodplain management policy and practice. One major result of past influences was the merging of flood control, disaster assistance, and resource protection programs. Future concerns lay in needed policy changes suggested by a number of floodplain and natural hazard response assessments conducted during the 1990s. Floods continue to teach us about the need for fundamental policy changes in disaster response, recovery, and mitigation and for long-term floodplain management. Because policy changes during the last decades of the twentieth century were largely the result of agency initiatives, the outlook for significant congressional actions going into the twentieth century are not promising for either providing overall direction on national flood policy or in coordinating federal programs and policies.

Association of State Floodplain Managers. (2002). ***Breaking the Cycle of Repetitive Flood Loss*****. Proceedings of the Twenty-sixth Annual Conference of the Association of State Floodplain Managers, Phoenix, Arizona, June 23-28, 2002. Madison, WI: Association of State Floodplain Managers.**
Keywords:
floodplain management, natural disasters, mapping, hydrology and hydraulics, geographic information systems, disaster planning, risk assessment, modeling, mitigation, repetitive losses, enforcement, compliance, Community Assistance Visits, Community Rating System
Abstract: *Breaking the Cycle of Repetitive Flood Loss* is divided into nine parts: analysis and aftermath of specific storms; flood hazard mapping; applications of new technology to floodplain management; flood forecasting and warning; hydrology and hydraulics; damage assessment, damage estimation, and risk analysis; modeling and its applications to floodplain management; floodplain management in practice; state and local projects and programs for flood hazard mitigation. Relevant contributions to this anthology include: (a) Nathan H. Foged's "State of California Awareness Floodplain Mapping," which explains a program that will identify and map flood hazards not already mapped by FEMA; (b) Donald W. Armour, Jr. and Cindy Crecelius's "Statewide Floodplain GIS for Ohio," which provides an overview of a Floodplain Management Geographic Information Management System (Floodplain GIMS) to manage selected information on flood hazards in Ohio; (c) John S. Grounds, III et al.'s "A Field Guide for Conducting Damage Assessments of Flooded Residential Structures," which describes a pilot program in Houston and Harris County, TX, to assess damaged structures in the post-flood

environment; (d) Eric Simmons and Edward Curtis's "Encouraging North Carolina Communities to Adopt Safer Floodplain Management Standards," which recommends how local officials can develop safer practices for development in the floodplain; (e) Gale William Fraser and Betty Hollister's "The Growing Importance of Communication in Floodplain Management," which emphasizes the importance of educating the public on the issues of flood safety and floodplain management; and (f) Adrienne Sheldon's "Community Assistance Visits in West Virginia," which discusses regulatory issues identified during 12 CAVs conducted in 2000.

Association of State Floodplain Managers. (2002). *Mitigation Success Stories IV*. Madison, WI: Association of State Floodplain Managers.
Keywords:
mitigation, Hazard Mitigation Grant Program, Flood Mitigation Assistance Program, Project Impact, Alaska, Arizona, California, Colorado, Delaware, Florida, Georgia, Illinois, Iowa, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Jersey, North Dakota, Ohio, Oregon, South Carolina, South Dakota, Washington
Abstract: For over two decades, mitigation activities have been implemented across the country to save lives, reduce property damage, and lessen the need for recovery funding. In many cases, mitigation success has been achieved following devastating disasters, when local officials and the general public have realized the need to effect change in their community. The fourth edition of this report profiles projects from 39 communities in 24 states in order to publicize the benefits of hazard mitigation. Each profile describes project benefits, costs, and funding sources.

Association of State Floodplain Managers. (2002). *New Trends in Floodplain Management, 2001*. Proceedings of the Twenty-fifth Annual Conference of the Association of State Floodplain Managers, Charlotte, North Carolina, June 3-8, 2001. Madison, WI: Association of State Floodplain Managers.
Keywords:
floodplain management, environmental policy, erosion, coastal areas, Special Flood Hazard Areas, flood control, mitigation, hydrology and hydraulics, geographic information systems, mapping, Base Flood Elevation, public policy, repetitive losses, compliance, enforcement, buyouts, disaster planning, International Code Series, Community Assistance Visits, Hazard Mitigation Grant Program
Abstract: *New Trends in Floodplain Management, 2001* is divided into 11 parts: protecting natural floodplain resources; special flood-related hazards; watershed management; techniques and projects in stormwater management; structural measures for flood hazard management; hydrology and hydraulics; applying GPS, GIS, and other technology; flood hazard mapping; national programs, policies, and initiatives; state, local, and regional programs and projects for flood mitigation; and partnerships for mitigation, disaster resilience, and sustainability. Relevant contributions to this anthology include: (a) Christopher Jones et al.'s "Consideration of a New Flood Hazard Zone: The Coastal A Zone," which provides evidence to support design and construction requirements in coastal A Zones more similar to those of V Zones than to those of riverine A Zones; (b) Duke G. Altman's "Balancing River Restoration Planning and Flood Control Requirements—San Antonio River in San Antonio, Texas," which explains an innovative and progressive design to restore a section of the San Antonio River; (c) Eric Berman et al.'s "Digital CAV (DCAV) Data Collection Tool," which describes new software to assist state officials in performing CAVs; (d) Edward Laatsch and Rebecca Quinn's "The International

Code Series: Issues Related to NFIP Participation," which discusses how communities have the opportunity to use the adoption of the I-Codes™ for their NFIP provisions; (e) Ross Richardson et al.'s "Implementation of the FEMA Repetitive Loss Strategy in Louisiana," which outlines a proactive strategy to address repetitive loss structures in Louisiana; and (f) Robert Sullivan and Mable Soong's "The Hazard Mitigation Grant Program: Overview and New Trends Towards an Improved Local and State Mitigation Tool," which summarizes efforts by FEMA and states to streamline the administration of HMGP.

Attanasi, E.D. and M.R. Karlinger. (1979). Risk preferences and flood insurance. ***American Journal of Agricultural Economics*****, 61, 490-5.**

Keywords:
insurance purchase decision, economic modeling, risk assessment

Abstract: A detailed theoretical model characterizing the individual's decision to purchase flood insurance is specified and the magnitude of the risk parameter is estimated using data based on transactions of flood insurance purchases. Empirical results for several samples of this subset of the general population indicated that consumers exhibited a relatively uniform degree of risk aversion across various localities where different hydrologic and economic conditions prevailed. More specifically, results indicate that the individual's demand for insurance becomes more price inelastic and shifts to the right as the risk parameter value increases. While the estimates presented should not be directly extrapolated to the entire population located in a flood prone area, they provide evidence that parameters determining an individual's and/or community's willingness to pay for flood protection can be measured.

Ayscue, Jon K. (1996). ***Hurricane Damage to Residential Structures: Risk and Mitigation.*** **Natural Hazards Research Working Paper #94. Boulder, CO: Natural Hazards Research and Applications Information Center, Institute of Behavioral Science, University of Colorado.**

Keywords:
hurricanes, wind, Hurricane Andrew, Hurricane Hugo, Hurricane Iniki

Abstract: This paper describes potential hurricane hazards from wind and water. Damage to residential structures from three recent intense hurricanes—Hugo, Andrew, and Iniki—shows that wind is responsible for greater property loss than water. The economic cost of the damages caused by these hurricanes is reported.

Ayyub, Bilal M., Andrew Nyakaana Blair, and Stuart A. Davis for BMA Engineering, Inc. (2000). ***Economic Consequence Assessment of Residential Flood Damage Expert-opinion Elicitation*****. Alexandria, VA: Institute for Water Resources, US Army Corps of Engineers.**

Keywords:
flood damage, Army Corps of Engineers

Abstract: This report offers the Army Corps of Engineers' assessment of the economic consequences of residential flood damage. USACE estimates residential structure and content values and damages and the associated uncertainty parameters in order to estimate damages from floods and the benefits of flood-damage reduction projects. USACE developed its Corps of Engineers Floodplain Inventory Tool (CEFIT) for organizing floodplain inventory data and estimating residential structure and content damage for various depths of flooding on a structure-by-structure basis. Information related to structure and content depth-damage relationships at the

component level is not available from historical records, prediction methods, or literature review. Expert-opinion elicitation provides a means of gaining information on these essential risk-related quantities. This report describes the different components of the expert-opinion elicitation process, outlines the process itself, and documents the results.

Babcock, Marion and Bruce Mitchell. Impact of flood hazard on residential property values in Galt (Cambridge), Ontario. *Water Resources Bulletin*, 16(3), 532-7.
Keywords:
Ontario, risk perception, attitudes, property values, urban areas, housing markets
Abstract: This study is an examination of the relationship between flooding and property values for an urban community in southwestern Ontario, which has a lengthy history of flooding. Peoples' perceptions of the effect of flooding on property values are discussed. Analysis of sales prices and assessment data demonstrated no statistically significant differences in values of property for residences located in high- and low-risk areas. Sales prices after the 1974 flood were significantly higher than sale prices before the flood. The perceived property values followed a similar pattern. The analysis concludes that differences in flood risk and flood experience do not adversely affect actual or perceived long-term property values.

Barnard, Jerald R. (1978). Externalities from urban growth: The case of increased storm runoff and flooding. *Land Economics*, 54(3), 298-314.
Keywords:
development, modeling, urban areas, hydrology and hydraulics
Abstract: This paper is concerned with the problem of increased frequency and magnitude of flooding from urban growth and its impact on urban residential property. The research involves a joint hydrologic and economic investigation into urban growth in small watersheds. Additionally, the paper adds to the list of negative externalities linked with urban growth, namely the increased flood hazard that can develop in a small watershed due to urban growth. Results indicate that an externality and income-distribution effect arise from urban expansion in a small watershed. The hydrologic evidence shows that as urban expansion spreads further into the upper portions of the watershed, the probability of flooding downstream properties is increased. The analysis of property values indicates that the property market has recognized the effect of flood hazard, and property owners in the lower part of the watershed have suffered a relative decline in property values

Baumann, Nancy and Rod Emmer. (1976). *Flood Insurance Community Planning*. Working Paper #29. Boulder, CO: Institute of Behavioral Science, University of Colorado.
Keywords:
Texas, Oregon, compliance, floodplain management, attitudes, risk perception, awareness
Abstract: This working paper contains two studies: "Adoption of the Federal Flood Insurance Program in Two Texas Communities" and "The Problems and Issues of Implementing the National Flood Insurance Act in Oregon." The first study analyzes the local power structure in the decision to adopt floodplain regulations in New Braunfels and Sequin, TX. Based on surveys and interviews with various stakeholders, the author finds that proposals for regulating the floodplain seem to encounter general public apathy, although they may produce conflict with the local power structure. Furthermore, the perception of respondents to the risk of flooding and their evaluation of the consequences of floodplain regulations varied considerably. However, as the

author notes, public officials in the two communities lacked a well-defined approach to promoting floodplain management and its consequences to citizens. The second study assesses the issues and problems of implementing the National Flood Insurance Act (the Act) in Oregon and seeks to determine, through surveying, the impact of the Act's land-use regulations and the attitudes of occupants of the floodplain towards insurance. Based on the assessment, the Act had greater impact at the local level than at the state level of government. Six counties and five cities in the state adopted regulations to participate in the NFIP. Over 50 percent of these local governments would not have instituted regulations, as least not as soon as they did, had it not been for the assistance provided to victims of floods by the NFIP. Furthermore, a survey administered to residents of the floodplain in Lane County, OR, revealed that 59 percent favored restricting development within the 100-year floodplain to open space and agriculture. Only 36 percent of respondents knew of the availability of flood insurance.

Bea, Keith. (1992). ***Federal Emergency Management Agency and the Disaster Relief Fund.*** **Washington, DC: Congressional Research Service.**
Keywords:
disaster assistance, federal programs, legislation, Stafford Act
Abstract: FEMA was established in 1978 by President Jimmy Carter and consolidated the emergency management and preparedness functions of various federal agencies. The agency is responsible for a broad range of statutory authorities and falls within the jurisdiction of a number of congressional committees and their subcommittees. FEMA administers the principal federal disaster relief authority, the Robert T. Stafford Disaster Relief and Emergency Assistance Act. While authorized disaster relief funds have traditionally been appropriated with little debate, a funding shortfall occurred in 1991. Action was taken to prevent recurrence of a shortfall.

Bea, Keith. (2000). ***Disaster Mitigation Assistance Bills in the 106th Congress: Comparison of Provisions.*** **Washington, DC: Congressional Research Service.**
Keywords:
development, floodplain management, legislation
Abstract: The author argues that the Clinton Administration's initiative to shift federal emergency management policy away from an emphasis on response and recovery generated little congressional controversy, although some raised concerns about the cost effectiveness of implementing a mitigation strategy. Greater attention, it is generally argued, should be given to mitigation (loss reduction) efforts before disasters occur in order to reduce future losses. Some future disasters may be prevented, or their impact lessened, by taking action beforehand. State and local governments have lowered disaster costs by retrofitting buildings in earthquake zones, elevating structures in floodplains, revising and enforcing building codes, or modifying land use plans. Advocates of the legislation seek to support these and other mitigation efforts.

Beard, Leo R. (1997). Estimating flood frequency and average annual damage. ***Journal of Water Resources Planning and Management,*** **123(2), 84-8.**
Keywords:
modeling, flood damage, economic modeling
Abstract: In the National Research Council's report, *Flood Risk Management and the American River Basin—An Evaluation*, the use of expected probability (accounting for sampling uncertainty) in estimating flood frequencies and average annual flood damages, as practiced by

the Army Corps of Engineers, was said to be biased. Alternative procedures recommended in the report are based on studies of samples drawn from a Gaussian population with a fixed damage function. There is no extension of the study to diverse populations (many flood locations) with different flow-damage functions, but conclusions drawn are that the recommended procedures provide frequency and damage estimates that are nearly unbiased. Beard demonstrates that expected-probability procedures used by the Army Corps of Engineers are appropriate for flood-frequency estimation and for estimation of average annual flood damages.

Belsie, Laurent. (1998). Rethinking a river. *The Christian Science Monitor,* December 3.
Keywords:
Midwest floods of 1993, Missouri River, environmental restoration
Abstract: This article examines efforts to return the Missouri River to a more natural state in the late 1990s. It discusses the importance of the river's floodplains to the ecology of the river, balancing the economic and commercial needs of people along the river with environmental concerns, the percentage of the river's native fish and wildlife species, which are on federal and state protection lists, the Missouri River Basin Association, and how the 1993 flood has impacted efforts to aid the floodplains.

Bennett, Dery. (1993). Paying for sand. *Audubon*, 95(Sept./Oct.), 132.
Keywords:
coastal areas, development, subsidies
Abstract: The author complains that despite geological evidence that the edge of the sea is an imprudent place to build houses, development along the Atlantic coastline is increasing. Many shore communities are inaccessible to the public yet rely on public funds for flood insurance, shore protection, post-storm cleanup, and restoration of houses damaged by coastal storms. The author concludes that if individuals were forced to bear more of the cost of shoreline living, homebuyers might think twice before deciding to build expensive homes on the coast.

Berz, Gerhard. (2000). *Flood Disasters: Lessons from the Past – Worries for the Future*. Munich, Germany: Munich Reinsurance Company.
Keywords:
economic impacts, public policy
Abstract: Flood disasters account for about a third of all natural catastrophes throughout the world (by number and economic losses) and are responsible for more than half of the fatalities. Trend analyses reveal that major flood disasters and the losses generated by them have increased drastically in recent years. Cooperation between the state, the affected population, and the insurance industry assumes a key role with regard to the flood hazard. Scientists, engineers, and insurers must work together in formulating their requirements and shaping them in such a way that politicians can derive clearly recognizable policy options (e.g., land-use restrictions) from them. Another important aspect is stepping up the efforts being made towards curbing climate change, which might otherwise exacerbate the risk situation in the future.

Bezuyen, M.J., M.J. van Duin, and P.H.J.A. Leenders. (1998). Flood management in the Netherlands. *Australian Journal of Emergency Management,* 13(2) 43-9.
Keywords:
flood control, Netherlands

Abstract: During the last several years, residential and commercial development of once unoccupied floodplains has increased significantly in the Netherlands. The development has prompted Dutch authorities to reconsider and revise their approaches to flood management. This article deals with several aspects of the floods that occurred in 1993 and 1995 and outlines the formal system of disaster management in the Netherlands. Finally, an overview is provided of the events that occurred during both floods with special emphasis on warning and evacuation. Important lessons drawn from Dutch flood management include: adoption of rules concerning entrance into an abandoned, flooded area; development of procedures for the evacuation of livestock; understanding of the economic consequences to agriculture, business, and industry; knowledge of how the government awards post-disaster aid; and the communication of flood-related information to the public. Furthermore, the authors cite the self-regulating behavior of the Dutch people as one of the most critical factors to their success with flood management.

Bialaszewski, Dennis and Bobby A. Newsome. (1990). Adjusting comparable sales for floodplain location: The case of Homewood, Alabama. *The Appraisal Journal,* 114-9.
Keywords:
Alabama, economic modeling, property values, housing markets
Abstract: This study tests the hypothesis that homes located in floodplains have lower property values. Data came from 93 home sales in Homewood, AL, of which 39 were from homes located within the 100-year floodplain. Control variables included square feet of heated area, finished basement, age of house, number of bedrooms, number of bathrooms, fireplace, car storage, and time on market. The housing market appears relatively homogenous because selling prices ranged from $48,000 to $90,000 and because all the homes had locations in the same school district. The authors fit the data with a stepwise-linear regression model. According to the regression model, a property's location in the floodplain does not have statistical significance. The authors conclude that while floodplain location does not influence property values in Homewood, appraisers of real estate should not generalize these results but rather conduct similar analyses for each housing market.

Bin Atan, Ismail and A.V. Metcalfe. (1994). Estimation of seasonal flood risk using a two-stage transformation. *Water Resources Research,* 30(7), 2197-206.
Keywords:
modeling, England
Abstract: Hydrological time series are often asymmetric in time, insomuch as rises are more rapid than recessions, as well as having highly skewed marginal distributions. A two-stage transformation is proposed for deseasonalized series. Rises are stretched and recessions are squashed until the series is symmetric over time. An autoregressive moving average (ARMA) model is then fitted to the natural logarithms of this new series. A double mixture of Weibull and exponential distributions represent the residuals from the ARMA model. The method is demonstrated with 24 years of daily flows from the River Cherwell in the south of England and a 40-year record from the upper reaches of the Thames. The article gives seasonal estimates of flood risk and these can be conditioned on catchment wetness at the time of prediction.

Bin, Okmyung and Steve Polasky. (2002). *Valuing Coastal Wetlands: A Hedonic Property Price Approach*. Working paper. Raleigh, NC: Center for Environmental and Resource Economics Policy, North Carolina State University.

Keywords:
North Carolina, wetlands, property values, economic modeling
Abstract: This study uses hedonic property price approach to estimate how wetlands affect nearby residential property values. Two general categories of wetlands are recognized – coastal and inland. A hedonic price function is estimated using wetland inventory data coupled with extensive property sales records in Carteret County, NC. Results indicate that proximity to coastal wetlands has a positive association with the nearby property value, while inland wetlands lower the value in a neighborhood. Reducing the distance to the nearest coastal wetland by 1,000 feet raises the property price by $1,010 at the initial distance of one mile, while the same change for inland wetlands decreases the property price by $567. In addition, this study utilizes a semi-parametric method in selecting an appropriate hedonic price functional form.

Bjonback, R. Derek. (1984). ***The Impact of the National Flood Insurance Program on Residential Property Markets.*** **(Ph.D. dissertation, Colorado State University).**
Keywords:
Minnesota, NFIP, mandatory purchase, insurance, development, property values, housing markets, economic modeling, risk perception, zoning, floodplain management, environmental policy, public policy
Abstract: This research aims to develop models of single-family housing and land markets to determine the nature of benefits from economic efficiency and distributional implications of improved information on flood hazard and floodplain development regulations introduced by the NFIP and to empirically test the model in a case study of Rochester, MN. A gain in economic efficiency is demonstrated when improved information on flood hazard can allow a household to make better decisions in planning housing purchase and investment, consumption, and saving over a lifetime. On the supply side, gains in economic efficiency are expressed as a socially optimum expansion of new construction in the flood-free zone, and contraction in the flood hazard zone. Accompanying these gains are distributional impacts for owners of properties in the floodplain (negative impact on property values) and outside the floodplain (positive impact) after the release of information on flood hazard. Pecuniary gains and losses of factors in the home construction and development industry can reduce the ability of the housing market to adjust to changes in consumer demand. The empirical model for Rochester did not significantly estimate the social value of flood hazard information or the distributional impacts of the NFIP on owners of existing homes and undeveloped residential land. The policy implications of the theoretical model and empirical tests conclude the analysis.

Blocker, T. Jean, E. Burke Rochford, Jr., and Darren F. Sherkat. (1991). Political responses to natural hazards: Social movement participation following a flood disaster. ***International Journal of Mass Emergencies and Disasters,*** **9(3) 367-82.**
Keywords:
socioeconomic impacts, natural disasters
Abstract: While much research attention has been focused on understanding and interpreting social movements that emerge in response to technological hazards, comparatively little work has been directed toward the systematic examination of factors related to protest activity in the aftermath of natural hazards. The authors study community activism after a major flood mitigation project failed to provide the promised protection from storm water damage. They conclude that citizen response to natural events is becoming far less distinct from that witnessed

in the aftermath of man-made events, because the technology to mitigate impacts of natural disasters is becoming more available. The results of the study show that solidarity is a necessary ingredient for social movement facilitation, particularly when the movement is loosely structured and urgently organized, and that the presence of solidarity aids in the communication of grievances, recruitment of members, and the coordination of activities.

Board of Governors of the Federal Reserve System. (1999). ***A Report to the United States Congress on Compliance with the National Flood Insurance Program*****. Washington, DC: Federal Reserve Board.**
Keywords:
Federal Reserve Board, lending institutions, mandatory purchase
Abstract: The Federal Reserve System has supervisory responsibility for approximately 1,000 state member banks (SMBs). During the review period of July 1, 1997 to June, 30, 1999, the Federal Reserve System conducted 697 examinations of SMBs for compliance with the flood insurance provisions of Regulation H (12 CFR 208). Thirty-nine SMBs were examined twice during the reporting period. The frequency of examinations for compliance with consumer regulations, including the flood insurance requirements, is based on the size of an institution and its history of compliance. Of the SMBs examined during the 1997-99 reporting period, 223 had violations of at least one section of the flood insurance provisions of Regulation H. The three most commonly cited violations reported by the examiners included the required use of the Standard Flood Hazard Determination form, the requirement to purchase flood insurance where available, and the notice of special flood hazards and availability of federal disaster relief. Generally, the violations of the flood insurance requirements of Regulation H appear to be isolated or technical and not indicative of any pervasive patterns of noncompliance.

Bollens, Scott A. (1990). Public policy and land conversion: Lessening urban growth pressure in river corridors. ***Growth & Change*****, 21(1), 40-59.**
Keywords:
floodplain management, development, Colorado, Missouri, North Dakota, Nebraska, Illinois, Georgia, Arizona, Ohio, Oklahoma, New Jersey
Abstract: The author examines the extent to which floodplain management programs influence the investment and predevelopment decisions of owners of vacant floodplain land in ten cities: Arvada, CO; Cape Girardeau, MO; Fargo, ND; Omaha, NE; Palatine, IL; Savannah, GA; Scottsdale, AZ; Toledo, OH; Tulsa, OK; and Wayne, NJ. He discusses the role of landowners in the urban floodplain market, land acquisition, holding vacant land, the influence of local floodplain policy on land holding, property value expectations, and as targets of public policy.

Bollens, Scott A., Edward J. Kaiser, and Raymond J. Burby. (1988). Evaluating the effects of local floodplain management policies on property owner behavior. ***Environmental Management,*** **12(3), 311-25.**
Keywords:
risk perception, floodplain management, riverine areas, development
Abstract: This article examines the degree to which riverine floodplain management affects purchase and mitigation decisions by owners of developed floodplain property. Based on a survey of 105 floodplain property owners in ten US cities with floodplain management programs, the authors find that the stringency of such policies does not lessen the purchase of

properties in floodplain because of the overriding importance of site amenity factors. Indeed, flood protection measures incorporated into development projects appear to add to the attractiveness of floodplain location by increasing the perceived safety from the hazard. Property owners' responses to a flood hazard after occupancy involve political action more often than individual on-site mitigation. It is suggested that floodplain programs will be more effective in meeting their objectives if they are directed at intervention points earlier in the land conversion process.

Booz-Allen & Hamilton. (2000). ***Blueprint for the Future: Final Report*****. Washington, DC: FEMA.**
Keywords:
strategic planning, NFIP
Abstract: From March through August 2000, FIA developed a strategic *Blueprint for the Future for the NFIP* through a series of leadership workshops attended by members of the FIA Executive Committee and through independent data gathering and analysis. This report incorporates the results of the workshops and supplemental analysis and includes a discussion of program mission, customer and stakeholder analysis, program vision, future scenarios, impediments to achieving strategy, goals and objectives, action plans, implementation guidance, and next steps. NFIP's Program Vision for the next five years is threefold: (a) a program that efficiently delivers insurance products that are accessible, desired, and seamlessly provided to its customers and partners; (b) a program where communities not only meet, but exceed NFIP's floodplain management standards; and (c) a program that is financially sound both as an agent of change and as a long-term insurance solution.

Boyet, Wayne E., Kenneth W. Hollman, and Wayne L. Sterling. (1976). ***The Impact of Flooding Upon Land Values in the Big Black River Basin*****. Mississippi State, MI: Water Resources Research Institute, Mississippi State University.**
Keywords:
Mississippi, Big Black River, economic modeling, property values, agriculture
Abstract: The primary purpose of this study was to determine the impact of flooding on the value of land in the Big Black River basin. Economic rent theory was extended and modified to explain how flooding influences land values. Two theoretical components of the overall effect of flooding were identified. First, flooding tends to cause shifts in land use to endeavors that yield lower returns. Second, flooding tends to increase production costs. The combined effect is to reduce realized earnings, thereby reducing land values. In order to obtain empirical estimates of these effects, sales price and other characteristics were ascertained for two independent samples of transfers, one flood-prone and one not subject to flooding. Regression analysis was used to develop a model to explain variation in transfer prices for each of the two samples. Different variables were important in explaining price variation, and there were significant differences in the coefficients of some variables between the two regressions. Additional regression analysis conducted on the flood-prone sample suggested that flooding that causes crop damage results in a reduction in value of $28 per acre or approximately 13 percent.

Bozell. (2001). ***The Cover America and Cover America II Campaigns: A History of Bozell's Efforts to Promote the National Flood Insurance Program.*** **Washington, DC: FIMA.**
Keywords:

Cover America, marketing, awareness
Abstract: This report reviews all of Bozell's efforts involving the Cover America campaigns and their work with the NFIP. The report summarizes all aspects of the Cover America and Cover America II campaigns, including types of advertising, the markets that were targeted, and when the ads ran. Bozell then presents the campaign results for the various types of media utilized and by each year of the campaigns. The overall results of the campaign show that both awareness and favorable opinions of flood insurance and the NFIP increased by 4 percentage points for each year of the campaigns.

Bozell and KRC Research & Consulting. (2000). ***Cover America Campaign Evaluation (Draft)*****. Washington, DC: FIA.**
NOTE: This report was in draft form at the time of it inclusion in this bibliography. Consequently, FEMA had not yet provided comments necessary for Bozell and KRC Research and Consulting to produce a final version.
Keywords:
marketing, Cover America
Abstract: This report was prepared as an evaluation of the Cover America campaign, which ran from October 1995 to March 1999. The campaign incorporated television, radio, and print advertising, as well as direct mailings and public relations efforts such as media tours and articles, to increase knowledge about floods and flood insurance and to help generate sales of policies. The report outlines the entire campaign by area of advertising and presents the methodology and results for determining the campaign's success. The report shows that the campaign was successful in increasing the awareness and favorability of FEMA and of the NFIP and outlines which methods were the most efficient way to reach potential buyers and agents.

Brown, John Prather and Robert Clarence Lind. (1976). ***An Economic Impact Analysis of the National Flood Insurance Program*****. Washington, DC: FIA.**
Keywords:
economic impacts, floodplain management, insurance premiums
Abstract: This report evaluates the NFIP's economic effects on property owners, the federal government, and the private insurance industry. The report finds that flood insurance is a more equitable and efficient way to cope with flood risks than relief programs and recommends using flood insurance premiums to finance grants and low-interest loans for temporary relief following flood disasters. Impediments to the purchase of flood insurance, namely the transaction costs that arise from selling flood insurance as a separate policy, could be reduced by bundling flood insurance with the traditional homeowner's policy. With respect to floodplain management, the report endorses elevating structures to the point where benefits from reduced flood losses exceed the costs of raising the structure by the maximum amount, rather than the 100-year flood level. The report advocates increased partnership with the private insurance industry and the elimination of government subsidies for reinsurance premiums. The proper role of the federal government should be to underwrite catastrophic risks, provide hydrological information, and subsidize premiums for existing homes.

Browne, M.J. and R.E. Hoyt. (2000). The demand for flood insurance: Empirical evidence. ***Journal of Risk and Uncertainty,*** **20(3), 291-306.**
Keywords:

insurance purchase decision, risk communication, insurance coverage
Abstract: Flood damages that occur worldwide remain largely uninsured losses despite the efforts of governmental programs that often provide insurance available at less than fair market cost. The current study focuses on the financial experience of the NFIP from 1983 through 1993 to examine the hypothetical determinants of decisions to purchase flood insurance. The same set of factors is important for both individuals and businesses—price, probability of loss, and amount of loss. Additionally, there is a negative relationship between the amount of money the federal government spends on mitigation and both the number of policies purchased and the amount of insurance purchased. At the state level, purchase of flood insurance correlates highly with the level of flood losses during the previous year.

Burby, Raymond. (1986). *Floodplain Management Research Needs: Improving the Productivity of Floodplain Management.* Chapel Hill, NC: Center for Urban and Regional Studies, University of North Carolina.
Keywords:
floodplain management, marketing
Abstract: This report identifies important research for improving the productivity of floodplain managers in state and local government. The report represents the input of individuals and organizations that work directly with floodplain management policies. A list of 145 research needs was generated by asking members of the Association of State Floodplain Managers, "What do you need to know to do a better job of floodplain management?" The report approaches the task of improving the productivity of floodplain management as a product development and marketing problem, focusing on how best to persuade various groups to adopt a product or practice. In this case, the groups are individuals, local and state governments, and firms, and the products or practices are uses, or non-uses, for flood hazard areas. The report recommends specific research needs in the areas of background information, implementation, and program planning, management, and evaluation, as well as changes in federal policy.

Burby, Raymond J. (1994). Floodplain planning and management: Research needed for the 21st century. *Water Resources Update*, 97(Autumn), 44-51.
Keywords:
floodplain management
Abstract: This article acknowledges the progress in research on the management of floodplains but laments the gaps in what needs to be known to manage floodplains effectively. State and local floodplain managers, in particular, will have to develop more sophisticated tools for building the private sector's commitment to and capacity for accomplishing flood-loss reduction. The major gaps that are highlighted include: (a) research on the effect of floodplain management on development decision making in the private sector and on the ultimate impacts of public policy on economic, social, and environmental well-being; (b) research on cost-effective programs that motivate individuals and firms to reduce risk to existing developments; (c) research on the impact of nonstructural flood-hazard mitigation programs on various accounts; and (d) research to identify the effects of existing floodplain management programs on communities' economic, social, and environmental well-being and to develop usable policy analysis tools for local decision makers.

Burby, Raymond J. (2001). ***Flood Insurance and Floodplain Management: Issues for Evaluation*****. Presented in Boulder, CO, July 2001.**
Keywords:
NFIP, floodplain management, hazard identification, mitigation
Abstract: To deal with the rising exposure to flood losses, the federal government provides flood insurance through the NFIP. The NFIP has three key elements: identification of flood hazard areas and risk; mitigation of flood losses through mandated local regulation of construction in floodplains; and provision of flood insurance. Evidence to date suggests that while its accomplishments are notable, in many respects the program has fallen short when measured against its primary objectives. Flood hazard identification is incomplete. Mitigation has failed to contain increasing exposure to property damage in floods and coastal storms. And, market penetration of flood insurance may be low, in spite of the availability of subsidized insurance rates for two-thirds of the buildings located in flood-hazard areas. These conclusions, however, are based on circumstantial evidence and need to be evaluated through systematic study.

Burby, Raymond J., Scott A. Bollens, James M. Holway, Edward J. Kaiser, David Mullan, and John R. Sheaffer. (1988). ***Cities Under Water: A Comparative Evaluation of Ten Cities' Efforts to Manage Floodplain Land Use.*** **Boulder, CO: Institute of Behavioral Science, University of Colorado.**
Keywords:
floodplain management, flood damage
Abstract: The authors studied the efforts of ten cities to manage land use in floodplains and conclude that floodplain management has significantly reduced annual flood damage (a saving of $11 million per year in reduced losses). However, the authors believe that the NFIP, by making floodplain structures safer through building standards and flood control works and more financially secure through flood insurance, seems designed to stimulate rather than hinder consumers' willingness to locate in floodplains.

Burby, Raymond. J. with Beverly A Cigler, Steven P., French, Edward J. Kaiser, Dale Roenigk, Dana Weist, and Dale Whittington. (1991). ***Sharing Environmental Risk: How to Control Governments' Losses in Natural Disasters*****. Boulder, CO: Westview Press.**
Keywords:
natural disasters, public policy
Abstract: This book summarizes the results of an extensive study of public losses from natural disasters during the 1980s and how those losses can be controlled through reforms in federal, state, and local policy. The study, initiated in 1986, considered its objective to provide a carefully conducted study that documents the magnitude and character of public losses in over 130 natural disasters, describes a range of policy options for dealing with those losses, and evaluates opportunities for and constraints on innovation and reform in this policy arena. The study uses data from federal records to investigate local losses due to natural disasters, a case study of the Whittier Narrows earthquake (October 1987) to demonstrate the wide variation in losses nearby governments experience in a large, Presidentially declared disaster, and several surveys to evaluate the impact of federal policies on local governments' adoption of protective measures.

Burby, Raymond J. and Steven P. French. (1981). Coping with floods: The land use management paradox. *Journal of the American Planning Association,* 47(July), 289-300.
Keywords:
floodplain management, development
Abstract: The authors surveyed 1,203 local political jurisdictions to measure their activities in floodplain management. The authors found that communities with the greatest exposure to the NFIP tend to have adopted the broadest, most stringent local programs. Yet, these very communities were often the ones that had allowed more development of floodplains in the past. The authors also found that the NFIP was not effective in slowing growth in the floodplains, partly because the communities that were experiencing the greatest growth were also inclined to join the program, causing adverse selection, which makes the paradox of the program apparent.

Burby, Raymond J. and Steven P. French with Beverly A. Cigler, Edward J. Kaiser, David H. Moreau, and Bruce Stiftel. (1985). *Floodplain Land Use Management: A National Assessment*. Boulder, CO: Westview Press.
Keywords:
floodplain management
Abstract: This book concentrates on floodplain management as a component of broader urban programs to control floods that might also include structural measures, floodproofing of existing buildings, participation in the NFIP, preferential tax treatment, density transfers, and public information programs. A major finding of the study is that management of land use in floodplains is most effective in communities that use a number of the aforementioned flood control instruments and in which the goal of flood control is integrated with other public objectives such as recreation, preservation of open space, and the protection of natural areas.

Burby, Raymond J., Steven P. French, and Edward J. Kaiser. (1980). *Managing Flood Hazard Areas: A Conceptual Framework for Evaluating Program Effectiveness*. Chapel Hill, NC: Center for Urban and Regional Studies, University of North Carolina.
Keywords:
floodplain management, methodology, economic impacts, socioeconomic impacts, environmental impacts, public policy
Abstract: This report takes a first step in the development of an improved capacity for evaluating the effectiveness of floodplain management and land use. It presents a conceptual framework for considering the context, role, objectives, components, and impacts of floodplain management. It discusses issues involved in measuring program effectiveness and develops an approach to explain why the impacts and effectiveness of programs to measure land use vary from one community to another. The research reported here is one part of a larger study of floodplain management. In addition to the development of this conceptual framework, other objectives of the research include: (1) determination of the state of floodplain management as it is practiced in the United States, (2) development of operational measures of effectiveness and a methodology for focusing them on monitoring and evaluating local floodplain management, and (3) an assessment of the proposed measures and methods based on field-level trial applications in three communities.

Burby, Raymond J. and James M. Holway. (1990). The National Flood Insurance Program's impacts on the development of riverine floodplains. In *Challenge Ahead: Flood*

***Loss Reduction Strategies for the '90s*. Boulder, CO: Institute for Behavioral Science, University of Colorado.**
Keywords:
floodplain management, riverine areas
Abstract: The authors compared changes in floodplain development between 1976 and 1985 in ten cities and conclude that the NFIP and the floodplain management regulations it has fostered in communities across the United States are having a measurable effect in reducing new development in riverine flood hazard areas.

Burby, Raymond J., Peter J. May, and Robert Paterson. (1997). *Improving Compliance with Regulations: Choices and Outcomes for Local Government*. Seattle, WA: Center for American Politics and Public Policy, University of Washington.
Keywords:
development, enforcement, compliance
Abstract: Shortfalls in compliance have been found in a number of recent reviews of development and environmental programs. In this article, the authors examine critical choices planning administrators face if they are to improve compliance. They also offer suggestions about what can be done to ensure that regulations, once adopted, are subsequently followed by contractors, builders, and developers. Based on data collected from a national sample of cities and counties, the article finds that improving compliance is not simply a matter of enhancing capacity for detecting and correcting violations. It shows that improving compliance also requires an increase in the private sector's willingness to comply with regulations voluntarily. The means for affecting this result include making greater use of incentives and employing facilitative enforcement techniques.

Bureau of Transport and Regional Economics. (2002). *Benefits of Flood Mitigation in Australia*. Canberra, Australia: Bureau of Transport and Regional Economics.
Keywords:
Australia, mitigation, cost-benefit analysis, structural approaches, nonstructural approaches
Abstract: Floods have accounted for 29 percent of the total natural disaster costs in Australia over the past 30 years. This report examines the costs, benefits, and performance of flood mitigation measures (e.g., structural and nonstructural options) in Australia to develop a series of case studies. The case studies aid in the construction of a more complete picture on the benefits realized through Australian flood mitigation projects. To a lesser degree, the report discusses and quantifies where possible, social and environmental considerations. A number of findings specific to the cases studies are presented in addition to more universal conclusions including, but not limited to: the importance of considering flood mitigation options that address all three sources of risk—existing, future, and continuing; the importance of community awareness and preparedness together with reliable and timely flood warning systems; and the importance of tailoring mitigation solutions to the uniqueness of each community. The availability and reliability of data and the capture and quantification of indirect and intangible costs and benefits limited some parts of the analysis.

Burges, Stephen J. (1979). Analyses of uncertainty in flood plain mapping. *Water Resources Bulletin*, 15(1), 227-43.
Keywords:

mapping, modeling
Abstract: Components contributing to uncertainty in the location of the fringe of a mapped floodplain are identified and examined to determine their relative importance. First-order uncertainty analysis is used to provide a procedure for quantifying the magnitude of uncertainty in the location of the fringe. Application of the procedure indicated that one standard deviation of uncertainty in floodplain inundation width is about one-third of the mean computed inundation width for several population-flood geometry combinations. Suggested mapping criteria, which directly incorporate uncertainty estimates, are given. While these criteria are more suitable for use in developing areas than in floodplains that have had extensive development, the analysis procedure can be used to accommodate property owners who challenge the validity of estimated flood fringe boundaries. Use of uncertainty analysis in floodplain mapping should enhance the credibility of the final plan.

Burkham, D.E. (1978). Accuracy of flood mapping. *Journal of Research, U.S. Geological Survey*, 6(4), 515-27.
Keywords:
mapping, hundred-year flood standard, hydrology and hydraulics
Abstract: This report describes and compares the probable standard errors of estimate in terms of national average for three different methods that have been used recently by the USGS to define flood-boundary elevations for 25-, 50-, and 100-year discharges in natural channels. The methods scrutinized by the author to determine the 100-year flood-boundary elevations include detailed, historical, and physiographic. In addition to describing the implementation of each method, the author also considers their limitations and accuracy. Based on the analyses and using 3.9 m as a national average for the 100-yr flood depth, the detailed method has a probable standard error of 23 percent (0.9 m), the historical method 23 percent (0.9 m), and the physiographic method 27 percent (1.1 m). The article also concludes that the detailed method has applicability to a wide range of hydraulic and topographic conditions, the historical method has similar applicability but only with the availability of specific data, and the physiographic method has the simplest applicability of the methods used.

Burn, Donald H. (1999). Perceptions of flood risk: A case study of the Red River Flood of 1997. *Water Resources Research*, 35(11), 3451-8.
Keywords:
awareness, risk communication, risk perception, Red River, disaster planning, Manitoba, Canada
Abstract: The author examines issues that affect an individual's perceptions of risk associated with national hazards in the context of the 1997 flood of the Red River in Manitoba, Canada. Information about risk perception came from ten public meetings held by the Manitoba Water Commission to review actions taken during the flood. The response to the flood event varied between and within various locations in the Red River Valley. Flood damages were limited in areas that were adequately prepared for the flood, where there was good support from local government, and where recent experiences from the 1996 flood were relevant. Areas that experienced widespread flood damage were those that were unable to prepare in time because of misleading experience in 1996 and poor forecasts, or newly flooded areas that lacked relevant flood experience and received limited warning and minimal support from the local government. The greatest success occurred where planning for the flood started early. The paper concludes that warnings of flood events should be tailored to the experiences of the individuals in different

areas since the unique experiences of the individuals will lead to different responses. However, because experience is a complex factor, there are limits to the benefits that can be derived from previous experience. Two recommendations are made: (a) the experience of individuals and local government officials should be used to revise and update the emergency flood response plan for an area and (b) public education immediately following a major flood event can increase awareness of flood risks and the importance of developing and following an emergency plan.

California Department of Water Resources. (2002). ***National Flood Insurance Program: FEMA Elevation Certificate*****. Sacramento, CA: California Department of Water Resources.**
Keywords:
California, floodplain management, compliance, enforcement, elevation certificates
Abstract: This handbook accompanies a workshop on elevation certificates taught by the California Department of Water Resources (DWR) to local floodplain administrators. In the handbook, DWR emphasizes the three purposes of an elevation certificate: to properly rate a flood insurance policy, to determine compliance with NFIP regulations and the local floodplain management ordinance (when combined with other documentation), and to support requests for map changes. Four sections of the handbook present examples of elevation certificates, building diagrams, and photographs for structures located in Zones AE, A, AO, and V. The handbook also includes exercises to ensure local floodplain administrators can use a FIRM and can complete an elevation certificate. Overall, the workshop and handbook should give local floodplain administrators the information needed to better advise property owners regarding elevation certificates.

California Department of Water Resources. (2002). ***National Flood Insurance Program: Floodplain Management and Duties of the Local Administrator*****. Sacramento, CA: California Department of Water Resources.**
Keywords:
California, NFIP, floodplain management, development, compliance, enforcement, mapping, substantial improvement, substantial damage, insurance, mitigation
Abstract: This handbook provides information on a broad range of issues related to floodplain management, mapping, mitigation, and insurance. Each section of the handbook contains PowerPoint slides used by the California Department of Water Resources to train local floodplain administrators on the NFIP. In addition to the slides, the handbook contains reprints of technical bulletins (e.g., nonresidential floodproofing) and forms (e.g., elevation certificate) issued by FEMA.

California Department of Water Resources. (2002). ***National Flood Insurance Program: Substantial Improvement & Substantial Damage*****. Sacramento, CA: California Department of Water Resources.**
Keywords:
California, substantial damage, substantial improvement, insurance, insurance coverage, mitigation
Abstract: This handbook accompanies an advanced workshop on substantial improvement and substantial damage taught by the California Department of Water Resources (DWR) to local floodplain administrators. The handbook covers several topics: improvement costs that must be included; rehabilitations, additions, and reconstructions; acceptable methods for determining

improvement costs; acceptable methods for determining market value; post disaster considerations; and Increased Cost of Compliance (ICC) coverage. DWR also provides sample affidavits for improvements and repairs, sample notices to property owners regarding substantial improvement and substantial damage, and supplemental documents on ICC coverage in the handbook.

California Floodplain Management Taskforce. (2002). *California Floodplain Management Report*. Sacramento, CA: California Floodplain Management Task Force.
Keywords:
California, compliance, floodplain management, strategic planning
Abstract: In February 2002, Governor Gray Davis delegated authority to the Department of Water Resources to convene a Floodplain Management Task Force (the Task Force). The Task Force focused on the intent of Assembly Bill (AB) 1147, which mandated the Task Force to examine specific issues related to state and local floodplain management and make recommendations for more effective statewide policies. The Task Force found existing programs do not adequately accomplish the goals of reducing flood losses and maximizing the benefits of floodplains. Furthermore, the Task Force identified the need for the state to comply with the NFIP. Based on its research and consideration of literature, the Task Force developed recommendations along three basic themes: better understanding of and reducing risks from reasonably foreseeable flooding; multi-objective-management (M-O-M) for floodplains; and local assistance, funding, and legislation. For example, in the theme of better understanding of and reducing risks from reasonably foreseeable flooding, the Task Force recommends that local communities adopt stricter regulations than those required by the NFIP (e.g., freeboard). Another recommendation asks the state to provide additional resources to continue and expand implementation of the state's floodplain management programs, including full support of the Community Assistance Program. The report outlines and discusses additional recommendations.

Camerer, Colin F. and Howard Kunreuther. (1989). Decision processes for low probability events: Policy implications. *Journal of Policy Analysis and Management,* 8(4), 565-92.
Keywords:
public policy, risk assessment, risk perception, risk communication, utility theory, insurance purchase decision
Abstract: This survey describes the impact that judgments and choices about low probability, high consequence events have on the policymaking process. Empirical evidence indicates that normative models of choice, such as expected utility theory, are inadequate descriptions of individual choices. The ambiguity of low probabilities also affects decisions in ways that are not normative. Further, people exhibit biases in judgments about risks and probabilities. These findings have stimulated development of new theories, such as prospect theory and generalized utility theories incorporating attributes such as regret. The authors survey many of these empirical results and explore their implications for policy. They consider the role of information, economic incentives, compensation, and regulation in inducing socially desirable effects through the reframing of outcomes. They suggest that surveys and experiments can help analysts better understand the decision process for low probability events and design more effective public policies.

Campbell, W.A. and M.S. Heath, Jr. (1979). *Legal Aspects of Flood Plain Management*. Chapel Hill, NC: Water Resources Research Institute, University of North Carolina.
Keywords:
floodplain management, legislation, North Carolina, legal issues and litigation
Abstract: The NFIP has made it possible for some landowners to obtain subsidized insurance protection against flood damages. As a condition of this protection, however, the local governments in which flood-prone land is located must adopt certain restrictions on the use of land in the floodway and flood hazard areas. North Carolina's legislative centerpiece for authorizing local floodplain regulations is the Floodway Act. This act was deficient both in terminology and in scope of coverage when examined in light of the NFIP's requirements. To remedy these deficiencies it is recommended that the act's coverage be broadened to include flood hazard areas beyond the floodway, to include areas of coastal flooding, and to delete the uses automatically permitted in the floodway. It is important for the state to play a major coordination and advisory role in land-use regulation for flood protection. Local governments need technical assistance in preparing and administering the necessary regulatory measures, and the state has an important role to play in coordinating local efforts with FIA and in overseeing the program. In addition, state property must meet the federal requirements in order for the state to obtain insurance or to qualify as a self-insurer. Statutory changes are suggested to meet these needs.

Cane, Marilyn and Paul A. Caldarelli. (1993). Apres le deluge: National flood insurance. *Nova Law Review*, 17(3), 1077-1091.
Keywords:
NFIP, takings, legislation, erosion, coastal areas, legal issues and litigation, mitigation, mandatory purchase, lending institutions, insurance
Abstract: This article examines the background of the NFIP from its inception to 1993, reviews proposed changes to the program as a result of perceived problems with current operations, and discusses constitutional "takings" issues concerning flood insurance. After introducing the reader to the NFIP, the authors discuss proposals under consideration by Congress to change the program. For example, one of the most controversial and important proposals concerns the establishment of a program to reduce coastal erosion. Under the proposed program, FEMA would delineate 10-, 30-, and 60-year erosion setbacks along US and Great Lakes coasts. In a 10-year setback zone, existing buildings would presumably be "in danger of imminent collapse," and owners could obtain grants to cover the cost of relocation (40 percent of the building's value) or demolition (40 percent of the building's value). (Note: these setback requirements were not included in the National Flood Insurance Reform Act of 1994.) Finally, the article discusses the "takings" issue as it relates to the NFIP. The courts have clearly held the constitutionality of the program as witnessed, for instance, in *Texas Landowners Rights Ass'n v. Harris.* In that case the court ruled, among other things, that the NFIP did not violate sovereign powers of state and local government or the principles of federalism embodied in the Tenth Amendment. A survey of additional court cases provides a broader context to the "takings" issue.

Carlozzi, Sinton and Vilkitis, Inc. (1978). *Attitudes Toward Flood Management in Northampton, Massachusetts: A Case Study*. Amherst, MA: Carlozzi, Sinton and Vilkitis, Inc.
Keywords:

awareness, nonstructural approaches, Massachusetts, risk perception, structural approaches
Abstract: This study examines the attitudes of citizens and government officials toward various means of reducing flood damage in Northampton, MA. The study was part of an ongoing series of investigations into flooding in the Connecticut River Basin and into economical, effective, and environmentally sound approaches to reducing flood damages. Town residents, floodplain residents, local, state and federal officials, floodplain businesses, and local civic organization representatives were interviewed. The study compares public opinions on nonstructural and structural approaches to mitigation and finds that the former were generally supported while the latter were generally opposed, citing political infeasibility or environmental impact.

Changnon, Stanley, A., Jr. (1985). Research agenda for floods to solve policy failure. *Journal of Water Resources Planning and Management*, 111, 54-64. Champaign, IL: Illinois State Water Survey Division.
Keywords:
mitigation, nonstructural approaches, public policy, methodology
Abstract: For the first 60 years of the twentieth century, US policy regarding floods was aimed at flood control. In the next 20 years, policy shifted to a goal of mitigation. However, flood losses continued to rise, which prompted Congress and others to raise questions about the causes of policy failure. The answer is complicated because flood policy involves four changing issues, including the shift from federal to state and local responsibilities, the existence and form of the NFIP, the shift to nonstructural approaches for flood mitigation, and the developing programs for emergency assistance. A comprehensive assessment of research needs reveals that policy must have a view of efficient use of floodplains, not just loss reduction. The socioeconomic database is considered inadequate for many policy decisions, and the knowledge of floods is uneven, with much more known in the physical sciences than in the social sciences. Attention to interdisciplinary research involving economists, sociologists, political scientists, and geographers is needed to achieve better policymaking and flood hazard mitigation.

Changnon, Stanley A., Jr. (1987). Future flood research agenda for the United States. In *Flood Hydrology: Proceedings of the International Symposium on Flood Frequency and Risk Analyses*. Louisiana State University, Baton Rouge, LA, May 1986.
Keywords:
mitigation, nonstructural approaches, structural approaches
Abstract: Flooding remains a major unresolved problem in the United States with losses mounting after 60 years of largely structural efforts to mitigate loss. Hence, a major two-year assessment of research needs to more effectively address flood mitigation was conducted within the context of our national shift to new federalism, the NFIP, the shift of emphasis from structural to nonstructural approaches for flood mitigation, and the evolution in national programs of emergency assistance where flooding is but one of many hazards treated. Recommendations for research centered around six general themes: (a) more attention to socioeconomic-political research; (b) a goal of efficient use of flood-prone lands, not loss reduction; (c) the importance of interdisciplinary research (70 percent of all 115 recommended tasks are multidisciplinary); (d) the need to develop comprehensive data banks and flood information centers; (e) orienting future research needs to user needs; and (f) the need for continuing re-assessment of flood research every three years.

Changnon, Stanley A., Jr., ed. (1996). ***The Great Flood of 1993: Causes, Impacts, and Responses*****. Boulder, CO: Westview Press.**
Keywords:
Midwest floods of 1993, socioeconomic impacts, disaster planning, public policy
Abstract: Through detailed case studies and sectoral analyses, this volume diagnoses the social and economic impacts of the Midwest floods of 1993, assessing how resource managers, flood forecasters, public institutions, the private sector, and millions of volunteers responded to it. This comprehensive evaluation of the 1993 flood examines the ways floods are forecasted and monitored, the effectiveness of existing recovery processes, and how the nation manages its floodplains. The flood offered major lessons for future flood disasters, both to the public and private sectors, and these lessons are identified. The emphasis here is on the flood's many impacts and the policy issues that they raise.

Changnon, Stanley A., Jr., R. Schicht, and R. Semonin (1983). ***Plan for Research on Floods and their Mitigation in the United States. Final Report to the National Science Foundation*****. Champaign, IL: Illinois State Water Survey.**
Keywords:
hazard identification, mitigation, strategic planning
Abstract: Recent assessments of flood problems and issues are used to compile a comprehensive assessment of the research needed relevant to flooding and flood mitigation. Experienced researchers identified four new major national issues or trends: (a) a shift in responsibilities from federal to state and local entities; (b) the policy of the NFIP; (c) the shift of emphasis from structural approaches to nonstructural approaches for flood mitigation, such as floodplain management and zoning, coastal zone management, flood warning systems, evacuation and relocation, flood insurance, and land acquisition; and (d) the recognition of the developing national programs in emergency assistance. The major conclusion of the assessment is that much flood-related research must be interdisciplinary in nature. It identifies 115 high-priority research tasks in the fields of meteorology, hydrology and hydraulics, ecology, public health, economics, sociology, political science, and interdisciplinary fields. All 115 tasks met the criteria for critical research, namely, that the problem being addressed will probably be solved by further research and that the cost of the research is justified by the benefits.

Chao, Phillip T., James L. Floyd, and William Holliday. (1998). ***Empirical Studies of the Effect of Flood Risk on Housing Prices*****. Alexandria, VA: Institute for Water Resources, US Army Corps of Engineers.**
Keywords:
housing markets, property values, economic modeling, Texas, Kentucky
Abstract: This study reviews existing academic literature on hedonic price models of the floodplain real estate market. In addition, two hedonic price model cases were studied to answer some of the questions raised in the literature review. The case studies used price data from USACE projects in Abilene, TX, and South Frankfort, KY. Findings from the literature review and the case studies do not satisfactorily conclude that the fair market value of floodplain properties either capitalizes or does not capitalize the flood damages borne by floodplain activities. The existing studies did not seek and the case studies lacked sufficient data to detect a discount for primary flood damages. In some cases a discount for location in the floodplain does not exist. In others, a discount for floodplain location does exist, but varies because of factors

such as relative location within the floodplain, flood insurance, flood history, and positive floodplain attributes. The variability of these factors across floodplain markets around the country makes the assumption that all floodplain properties are discounted for primary flood damages unreasonable. The foremost issue is including positive and negative attributes of floodplain properties in the hedonic price model to separate the discount due to primary flood damages from the discount due to floodplain location. Identifying and measuring all these floodplain attributes presents many challenges. Future research may fail to identify all the attributes that buyers consider when purchasing a floodplain property.

Chatham County, GA. (2000). Preparing a crisis communication plan. *Presented at the Project Impact Summit 2000.* Washington, DC, November 14-15, 2000. Washington, DC: FEMA.
Keywords:
Georgia, floodplain management, risk communication, disaster planning, media
Abstract: This presentation points out the need for communities to have a crisis communications plan to audit all vulnerabilities, establish guidelines for crisis communication coordination, state roles of key people and agencies, and precoordinate with other plans before a crisis occurs. When a crisis occurs, the document suggests that communities assess the incident, assemble a crisis team, communicate facts, and minimize rumors. It also suggests, among others, that communities should activate a crisis center, designate a lead spokesperson, develop a crisis fact sheet, contact critical players, open a media center, and establish guidelines for the news media.

Chatham Emergency Management Agency. (2000). Media guidelines. *Presented at the Project Impact Summit 2000.* Washington, DC, November 14-15, 2000. Washington, DC: FEMA.
Keywords:
Georgia, floodplain management , risk communication, disaster planning, media
Abstract: This presentation details the procedural guidelines to be employed whenever the Chatham County (GA) Emergency Operations Center (EOC) is activated. The goal of these guidelines is "to ensure the most rapid and comprehensive news coverage while permitting unimpeded emergency response operations." Some of the suggested procedures include a preliminary media briefing prior to activation of the EOC; after the initial activation of the EOC, allow the media, one station or network at a time, to take file footage shots of the EOC; to make available a media office next to the press conference area in the basement; reserve parking space for media vehicles; as developing conditions permit, to conduct routine press conferences each hour according to pre-established schedules; and to accommodate specific requests for information whenever possible.

Cheatham, L.R. (1975). *A Case Study of Some Economic Aspects of the National Flood Insurance Program.* Starksville, MS: Water Resources Research Institute, Mississippi State University.
Keywords:
property values, Mississippi, development
Abstract: Based on a study of Columbus, MS, this research was designed to determine if subsidized, pre-FIRM insurance has been a cause of increases in capital investment on that community's floodplains. The scope was limited primarily to determining the effect on new

construction, on location decisions of businesses, and on land values. Analysis of flood insurance statistics, amounts of new construction, location decisions, and data on land values in Columbus revealed only insignificant evidence to substantiate the hypothesis that flood insurance has encouraged encroachment into floodplains. The results suggested that most firms did not view the flood hazard as being as great as other types of insurable hazards. Moreover, in general, both commercial and noncommercial properties subject to flooding had shown greater increases in value than those of negligible flood hazards. The only exceptions included those with extremely high-expected flood frequencies. The effects of subsidized flood insurance on land values were relatively insignificant. Economic growth factors were primarily responsible for increases in values of land in floodplains. Lastly, the study revealed little evidence to support the hypothesis that subsidized flood insurance stimulated encroachment. Federal disaster aid appeared to provide more inducement to locate and remain on lands where flood losses were likely to be sustained.

Cheatham, L.R. (1979). ***An Assessment of Some Economic Effects of FIA Land Use Requirements on Urban Coastal Zone Development.*** **Starksville, MS: State Division of Business Research, Mississippi State University.**
Keywords:
economic impacts, property values, coastal areas, Mississippi, urban areas
Abstract: Land-use requirements for eligibility in the early NFIP did not cause any significant decreases in total annual construction in urban coastal floodplains along the Mississippi Coast. Construction activity in A Zones continued at high levels. The relatively high cost of elevating residential structures, along with other factors unrelated to ordinances, caused some relocation of new construction to other areas of communities. The inability to construct commercial structures to comply with ordinances and maintain functional utility prevented some commercial construction. The impacts on construction employment were negligible. The value of land and existing structures increased in communities, but less so in Zone A. The county's total construction employment and income were not affected by ordinances. In the community of Biloxi, MS, less than half of total new construction in Zone A was actually regulated due to exemptions for repairing, remodeling, and so on, not exceeding 50 percent of structure's value. In this community, construction of regulated new structures decreased slightly, but patterns in nonresidential new structures did not confirm any decrease. Total construction in Biloxi increased since ordinances were implemented.

Childers, Cheryl D. (1999). Elderly female-headed households in the disaster loan process. ***International Journal of Mass Emergencies and Disasters,*** **17(1), 99-110.**
Keywords:
disaster assistance, socioeconomic impacts
Abstract: The purpose of this exploratory research was to compare the income and approval rates of elderly single-female households and other types of households applying for disaster aid. Households from two parishes involved in the flooding in and around New Orleans, LA, in May 1995 who applied for federal loans via FEMA's National Teleregistration Center were compared on demographics and outcomes. The analysis showed that elderly single-female households were over represented in the population applying to FEMA; they were two and one-half times as likely as other elderly households or nonelderly households to have incomes of $11,000 or lower; and three times less likely than other elderly households to receive a low-interest loan. This study

indicates that the current federal low-interest loan program does not adequately address the needs of poor elderly women. Special initiatives are needed that target this population effectively.

Chivers, James and Nicholas Flores. (2001). ***Market Failure in Information: The National Flood Insurance Program*****. Discussion Paper in Economics, No. 01-6. Boulder, CO: University of Colorado.**
Keywords:
insurance purchase decision, risk perception, insurance premiums, awareness, economic impacts
Abstract: The NFIP requires mandatory purchase of flood insurance for property owners who have federally backed mortgages. Krutilla (1966) noted that a compulsory national flood insurance program could greatly improve the economic efficiency of floodplain occupancy in the United States. However, in order to realize the efficiency gains suggested by Krutilla, property owners must have sufficient information about flood risk and insurance premiums to make well-informed home purchase decisions. Using survey data from Boulder, CO, this report finds significant evidence of market failure in information in the NFIP. The majority of survey respondents, all of whom live a SFHA, report they did not fully understand the degree of flood risk or the cost of insuring against this risk when negotiating the purchase of their property.

Chrichton, David. (2003). ***Flood Risk & Insurance in England & Wales: Are There Lessons to be Learned from Scotland?*** **London, England: Benfield Greig Hazard Research Centre.**
Keywords:
England, Wales, Scotland, nonstructural approaches, floodplain management, mitigation, insurance, flood disaster planning, legislation, public policy, risk management
Abstract: Since 1995, the author has been concentrating on nonstructural measures, such as planning controls and sustainable drainage. Through this report, he hopes to show that nonstructural approaches have been particularly successful in Scotland. Many experts around the world now see nonstructural measures as being a more sustainable, efficient way to tackle flood-related problems. For example, years of meetings at the local level have given the author an opportunity to influence planning strategies for communities throughout Scotland. Current planning strategies for most of these communities now prohibit any new housing development where the flood risk exceeds the 200-year event. In addition, differences in legislation in Scotland have resulted in preparations being made for a test case for insurers to recover up to £70M in claims payments from a local authority in Scotland. If successful, it could have important implications for the flood risk and insurance in England and Wales. The author's discussions with senior underwriters of many of the leading British insurance companies have indicated that they have little awareness of what Scotland has achieved. He hopes that this report will help to remedy that situation. While the solutions are working well in Scotland, it may already be too late for southeastern England, where some radical measure may be required in the future. The future outlook section at the end of this report lists some of these measures.

The Christian Science Monitor. (1998). Buying back beaches. ***The Christian Science Monitor,*** **September 8**.
Keywords:
erosion, beach nourishment
Abstract: This editorial discusses efforts in the United States to prevent further erosion of the country's beaches and shorelines. It forecasts the percentage of people who will live near the

shore by 2025 and hypothesizes why changes to the NFIP could be effective. It questions the validity of beach restoration projects, and discusses efforts by the federal government to shift the cost of erosion prevention programs to states and local communities.

Clark, R.D. (1998). *CAI Comments to FEMA Regarding the National Flood Insurance Program*. Washington, DC: FEMA.
Available at http://www.caionline.org/govt/advoc/fed/fema-flood-comments.cfm
Keywords:
insurance premiums, community associations
Abstract: The Community Associations Institute (CAI) represents the nation's 205,000 condominium associations, cooperatives, and homeowner associations. In the opinion of the CAI, FEMA's residential condominium/association building policy (RCBAP) contains a coinsurance requirement that places an undue penalty on community associations and has skewed data for rate determinations. CAI further suggests that FEMA should eliminate the coinsurance requirement, as the NFIP does not require coinsurance for any other type of building. Eliminating the requirement will allow for affordable premiums by way of lower coverage limits. In turn, more associations would carry flood insurance allowing for a broader premium base to help FEMA absorb large shock losses and help minimize adverse selection. CAI also takes issue with FEMA's policy deductibles (limited to $1,000 and $5,000), and suggested that FEMA allow for higher deductibles so that associations can afford to carry flood insurance. Increased coverage will reduce the risk of loss due to the perils of flood, heavy rains, or other water sources. Attendant to higher deductibles should be dramatic reductions in rates. Since the majority of flood claims occur in the first dollar layers of coverage, self-insuring associations (those that choose high deductibles) will be rewarded with significantly reduced premiums.

Clemens, Petra and Jennifer R. Hietala. (1999). Risk of domestic violence after flood impact: Effects of social support, age, and history of domestic violence. *Applied Behavioral Science Review,* 7(2), 199-207.
Keywords:
domestic violence, North Dakota, health effects, socioeconomic impacts
Abstract: Community professionals observed an increase in domestic violence during the aftermath of the 1997 Grand Forks flood. In the past, research has documented emotional symptoms that result from natural disasters, and separate studies have observed domestic violence to result from these same emotional symptoms. No research was found, however, specifically on the effects of natural disasters on domestic violence. The current study tested the effects of a model of variables on domestic violence, including flood impact, the emotional symptoms, as well as other intervening variables that might act as a buffer against the effects of flood impact. Results of this cross-sectional survey of 140 adults in Grand Forks, ND, indicate that domestic violence was significantly greater among respondents after the flood. Flood impact led to increased levels of anxiety, depression, and hostility. Whether these emotional symptoms subsequently led to increased domestic violence depended on the level of social support, the age of the respondent, and whether he/she had a history of domestic violence before the flood. Those with lower social support, the elderly, and those with a prior history of violence were most affected. The results have implications for work with the elderly, with domestic violence treatment and prevention programs, and with communities affected by floods.

Clinton, William J. (1995). Message to the Congress transmitting the report on floodplain management. *Weekly Compilation of Presidential Documents,* 31(10), 372-7.
Keywords:
floodplain management, Mississippi River
Abstract: This message focuses on the proposal to reform floodplain policy for the Mississippi River in the wake of the damage caused by massive floods in 1993. It discusses the impact of the flood on agricultural and urban property owners, the construction of mainstream levees, and the conversion of wetlands to agriculture. The message concludes that the conversion of floodplain and wetlands to agriculture throughout the Mississippi River Basin has been extensive. Eighty percent of the floodplain wetlands of the Lower Mississippi River have been cleared and converted to cropland. Clearing rates in much of the Upper Basin and the Missouri River system have been comparable. The message also suggests that the Mississippi River's system of dams, levees, and river training works is tremendous but not sustainable over the long term: "People have gone too far in severing the river and its tributaries from their floodplains. The message from the floods is that the Mississippi wants to recapture the floodplains that historically were part of the river. It lies in wait for major flood events to do this." The message concludes by noting that: "A program of floodplain restoration would go a long way towards creating a much more sustainable, low-cost flood management system in the Mississippi River Basin than exists today." Finally, the President suggests that the Corps of Engineers must reform how it spends federal dollars on flood control works in the basin, while the federal government expands the Wetland Reserve Program created by the 1990 Farm Act in the Mississippi Basin.

Colegio de Ingenieros y Agrimensores de Puerto Rico, Agencia Estatal para el Manejo de Emergencias y Desastres, y FEMA. (2002). *Inundaciones y Derrumbes en Puerto Rico: Guía de Mitigación de Daños*. San Juan, PR: Agencia Estatal para el Manejo de Emergencias.
Keywords:
Puerto Rico, flood causes, NFIP, disaster planning, mitigation
Abstract: This guide provides information to residents on serious problems that continually affect Puerto Rico: floods and landslides. The first and second sections of the guide discuss in detail the phenomena of floods and landslides including their histories in and consequences to the island. The third section focuses on the regulations that apply to construction in areas prone to flooding. Emphasis is given to the interpretation of FIRMs and Puerto Rico's participation in the NFIP. The fourth section provides information on how to prepare for, confront, and cope with flooding. The fifth section focuses on alternatives and solutions to mitigate the effects of floods and landslides on residential construction. Finally, an appendix lists contact information for organizations and agencies involved with disaster planning and assistance.

Comerio, Mary C. (2000). Paying for the next big one. *Issues in Science and Technology*, 16(3), 65-72.
Keywords:
insurance, Hurricane Andrew, mitigation, California, Florida, Hawaii, Illinois, Wisconsin, Oklahoma
Abstract: The author states that private insurance companies were shocked by losses from natural disasters such as Hurricane Andrew. Consequently, most companies no longer offer disaster insurance along with a traditional homeowner policy in California, Florida, and Hawaii.

Coverage is available only through state-managed disaster insurance pools with high premiums, high deductibles, and limited coverage. The author points out that until 1996, disaster appropriations were designated as emergency funds and were therefore exempt from budget limitations. The 104th Congress changed that rule, and now supplemental disaster appropriations require compensating cuts from other domestic programs. Thus, the author argues, although the public believes that insurance is unnecessary because FEMA will be there to pick up the pieces, the reality is that federal disaster recovery programs will be subject to political whims and partisan deals. To bolster disaster recovery, new policies that promote shared risk and responsibility are urgently needed. The author explains that, because of the limited availability of insurance and caps on federal spending, FEMA has advocated establishing "disaster resistant communities." Under this strategy, seed funds would be provided to cities to promote mitigation of hurricane hazards by building owners before disaster strikes in order to limit federal and personal recovery costs. This program has enjoyed some success. However, the success of individual projects does not necessarily translate into regional or national programs. One of the limitations of this program is that, despite the fact that mitigation can reduce losses, the real estate market does not reward a building owner for such expenditures in higher rents or higher property values. Similarly, FEMA has a program to buyout homes and property in flood-prone communities are purchased and converted to parks or wetlands. Although this program has been a success in a few small towns in Illinois, Wisconsin, and Oklahoma, most owners simply refuse to move or even elevate their homes. The author argues that the promotion of predisaster mitigation by the government will need a combination of regulation and incentives. Tax credits are an obvious incentive, she notes, but she also complains that they tend to go to those who would do the mitigation anyway. To reach a large number of homeowners and some apartment owners, it is important to devise a policy that taps into the real estate marketplace. The author concludes that, since FEMA wants to promote mitigation to reduce costs, the agency should promote policies to help insurance companies return to the market and promote programs that incorporate safety assessments into real estate transactions.

Committee on Banking and Currency, House of Representatives. (1967). ***National Flood Insurance Act of 1967*****. Washington, DC: Government Printing Office.**
Keywords:
insurance industry, legislation
Abstract: The bill authorizes a national program under which flood insurance is made available to residents of flood-prone areas. The provision of flood insurance supplements infrastructure investment in structural mitigation and relief measures following flood disasters, neither of which has proven to be a permanent solution to the costs of flood disasters. The bill stipulates that flood insurance policies outstanding shall not exceed $2.5 billion initially. Discussion of the bill includes a demonstration of the performance of the flood insurance program in illustrative examples of minor and major floods.

Committee on Banking and Currency, United States Senate. (1968). ***Housing and Urban Development Act of 1968*****. Washington, DC: Government Printing Office.**
Keywords:
insurance industry, legislation
Abstract: Title XII of the act establishes a flood insurance program under the direction of the Department of Housing and Urban Development. The act seeks to maximize the involvement of

the private insurance industry and perceives a completely federal program as the least desirable form for a national flood insurance program. The objectives of the land-use criteria for protected land are to restrict development in flood hazard areas, reduce damage caused by floods, and improve long-term land management and use of flood-prone areas. Residents who pay premium rates below actuarial cost will be limited in the amount of liability in their insurance: to $15,000 per dwelling unit and $30,000 for any single structure. The act prescribes that rate studies be carried out by the Army Corps of Engineers, the US Geological Survey, the Soil Conservation Service, and the Tennessee Valley Authority. Federal subsidies are justified as a temporary solution to the long-range readjustment of land-use patterns. The act also authorizes the Department of Housing and Urban Development to borrow money from the Department of the Treasury to cover program costs.

Conners, John B. (1998). ***Coastal Exposure and Community Protection: Hurricane Andrew's Legacy*****. Collingdale, PA: DIANE Publishing Company.**
Keywords:
hurricanes, building codes, coastal areas, property values
Abstract: This book examines problems raised by destructive hurricanes with respect to the growing concentrations of people and property in high-risk coastal areas. It also discusses the urgent need to provide better protection for people, buildings, and communities through more rigorous construction standards and better enforcement of building codes, flood insurance requirements, and land-use regulation in areas subject to hurricanes. It includes an appendix showing the value of insured coastal property exposures by state for counties bordering the Atlantic Ocean and the Gulf of Mexico.

Conrad, David R., Ben McNitt, and Martha Stout. (1998). ***Higher Ground: A Report on Voluntary Property Buyouts in the Nation's Floodplains: A Common Ground Solution Serving People at Risk, Taxpayers and the Environment.*** **Washington, DC: National Wildlife Federation.**
Keywords:
buyouts, floodplain management, nonstructural approaches, mitigation, Project Impact, relocation, repetitive losses, substantial damage
Abstract: This report reviews the status of voluntary property buyouts and relocations as a strategy for floodplain management. In addition, the report analyzes the 18-year history of repetitive flood losses to identify communities that may have significant potential to utilize new nonstructural approaches to reduce flood hazards. The report provides recommendations for program and policy changes to improve floodplain management and to increase the utilization of nonstructural approaches to reduce flood damages. Some of the offered recommendations include: the need for federal, state, and local governments to coordinate and develop predisaster hazard-mitigation plans to facilitate timely, coordinated hazard-mitigation efforts before and after floods occur; the need for Congress and the Executive Branch to provide support for programs such as FEMA's Project Impact and to develop a flexible, consolidated, and streamlined voluntary buyout and relocation assistance program; the need for FEMA and Congress to revise flood insurance rate schedules and community participation standards for the NFIP to provide increased incentives to reduce flood risks; the need for FEMA to enforce the NFIP's substantial damage requirement for elevation or removal of substantially damaged buildings after floods; the need for Congress and the Executive Branch to eliminate the current

bias in federal water resource project planning and evaluation procedures that favor structural approaches for flood damage prevention and mitigation over nonstructural approaches; the need for Congress to reduce the basic cost-share for federally supported flood control projects to 50 percent, with incremental cost-share incentives to promote flood hazard mitigation ranging to a maximum 65 percent federal cost-share; and the need for Congress and the Executive Branch to increase levels of funding and support for programs that provide technical assistance to states and communities for improving floodplain management and flood loss reductions activities.

Cordes, Joseph J. and Anthony M.J. Yezer. (1998). In harm's way: Does federal spending on beach enhancement and protection induce excessive development in coastal areas? *Land Economics,* 74(1), 128-45.

Keywords:
development, insurance premiums, coastal areas, subsidies, economic modeling

Abstract: Residential development on beaches grew faster in the past 32 years than residential development generally. In the 42 beachfront communities examined for this paper, the average annual rate of growth in housing units (3-9 percent) was well above the nation generally (2.4 percent) between 1960 and 1992. The authors offer an econometric model to measure the extent to which this growth can be attributed to (a) demand for recreational property; (b) public investments in shore protection (such as USACE projects) and (c) the NFIP. They conclude that, on balance, "the growth in beach front communities has been prompted mainly by increased demand for recreation caused by rising income and employment in inland areas. Federal flood insurance also appears to have encouraged additional shoreline development. But public investments in shore protection seem to have had little or no effect." The authors go on to say the NFIP's effect depends on whether the insurance premium is subsidized. During the emergency phase of the program, before flood insurance rate maps are available, the authors' model suggests that the NFIP had a significant positive effect on residential development, resulting in an increase of building permits of about 50 percent over what they otherwise would have been. This finding is in direct contrast to the conclusion of the General Accounting Office (1982) that said the program had only marginal effect on development. It supports the findings of Shilling, Sirmans, and Benjamin (1989) that during the NFIP's emergency phase, the program created an incentive to develop as much land as possible before a FIRM was finished. Developers recognized that property built after the map was in place would not qualify for subsidized insurance rates. This is carried forward in the authors' further finding that once a community moved into the regular (post-FIRM) phase of the program when insurance would be available only at actuarial rates, the program did not precipitate growth or development.

Correia, F.N., M.D. Saraiva, F.N. Da Silva, and I. Ramos. (1999). Floodplain management in urban developing areas. Part I - Urban growth scenarios and land-use controls. *Water Resources Management,* 13(1), 1-21.

Keywords:
development, floodplain management, urban areas, geographic information systems, Portugal

Abstract: Some of the most critical flood problems occur in urban areas where values at risk are higher and damages tend to be larger than in nonurban areas. Fast developing urban regions raise problems because of the unsteady situation of these regions in terms of catchment land-use and urban encroachment. A realistic approach to flood management in these situations requires the consideration of urban growth scenarios and the simulation of the corresponding flood

conditions. Coastal towns are frequently located in floodplains and are subject to flood hazard. This is the case for many coastal areas in Southern Europe that are still developing fast due to in-migration. In such cases, flood management cannot be disassociated from land-use management, and non-structural measures for flood control can play a crucial role. It is important to make an ex-post evaluation of these measures in areas where they have been adopted. These issues are addressed in two Portuguese catchments, representative of urban growth and related to flood problems in Portugal and other Southern European regions. The Laje catchment is used for the ex-post evaluation of nonstructural measures, and the Livramento catchment is used for the modeling of urban growth scenarios. Quantitative results and policy recommendations are presented based on these two case studies. Floodplain management is better done with Geographic Information Systems (GIS), especially if it is linked to hydrologic and hydraulic modeling capabilities. The use of GIS for conducting these studies is presented in Part II of the article.

Correia, F.N., M.D. Saraiva, F.N. Da Silva, and I. Ramos. (1999). Floodplain management in urban developing areas. Part II - GIS-based flood analysis and urban growth modeling. ***Water Resources Management,*** **13(1), 23-37.**

Keywords:
floodplain management, development, urban areas, geographic information systems

Abstract: In Part I of this article the very dynamic nature of floodplain management was discussed and the need for modeling the urban growth processes and formulating scenarios of urban development was emphasized. In this second part, the use of Geographic Information Systems (GIS) for addressing those problems is presented. GIS has been recognized as a powerful means to integrate and analyze data from various sources in the context of comprehensive floodplain management. Adequate information and prediction capability is vital to evaluate alternative scenarios for flood mitigation policies and to improve decision-making processes associated with floodplain management. A framework for the comprehensive evaluation of flood hazard management policies is also addressed in this article. This comprehensive approach to flood problems is more than an attitude or a philosophical starting point. It makes use of specific technological tools conceived to be used by different actors, some of them being non-experts in flood analysis. These tools, based on GIS, are appropriate for a participatory approach to the formulation of strategies for floodplain management because they help communicate with the public in a scientifically correct and yet rather simple manner.

Coy, Peter. (1999). Don't subsidize castles built on sand finance. ***BusinessWeek,*** **September 27.**

Keywords:
Hurricane Floyd, flood damage, federal programs

Abstract: Hurricane Floyd did more than destroy real estate. By the time the cleanup and rebuilding are complete, US taxpayers will have paid for Floyd through subsidized flood insurance as well as grants and low-cost loans to people living in federally designated disaster areas. The author believes that government policies thwart sensible behavior. They make it too easy for people to live in beautiful but disaster-prone places such as barrier beaches, floodplains, cliff sides, tinder-dry canyons, and seismic fault zones. That is one reason why financial losses from natural disasters are growing at a rate faster than the economy itself is expanding. The solution is not an elaborate new government disaster-relief program. In most cases, the best thing

the government can do is to get out of the way and let the free market do its work. James Lee Witt, Director of FEMA, advocates denying subsidized flood insurance to people who make repeated claims and refuse to take preventive measures, ranging from sealing their basements to raising their houses on stilts. A version of the proposal was introduced in the House of Representatives this summer as the "Two Floods and You Are Out of the Taxpayer's Pocket Act." Meanwhile, the Coastal Barrier Resources Act is up for reauthorization. A revamped disaster-insurance program would not only save money, it would save lives. With the proper incentives, people will choose to live in safe homes on safe ground and everyone will benefit.

Cross, John A. (1985). *Flood Hazard Disclosure by Realtors*. Natural Hazard Research Working Paper # 52. Boulder, CO: Natural Hazards Research and Applications Information Center, Institute of Behavioral Science, University of Colorado.
Keywords:
Florida, insurance purchase decision, risk communication, risk perception
Abstract: This study examines the effectiveness of realtors and mortgage bankers in communicating risk associated with flood zones to prospective homebuyers within the Lower Florida Keys. Different states have different laws regarding realtor obligations to inform homebuyers of natural hazard risk. However, courts may hold real estate agents and brokers liable for failure to disclose hazards even when the law does not explicitly require them to do so. The study found that only 52 percent of prospective homeowners reported being advised about the threat of hurricane flooding by realtors. Survey responses from realtors contradicted this figure. Nevertheless, the proportion of homebuyers who reported that they were informed of the threat of hurricane flooding has risen over the past few years. Methods of hazard disclosure were highly variable among real estate professionals, and only 27 percent reported having a personal or office policy concerning hazard disclosure. Conversely, realtors reported that few homebuyers asked about hurricane safety. The impact of realtors is limited for purchasers of mobile home residences, nearly half of who purchased their homes directly from a previous owner. Over one third of residences in the area studied are mobile homes.

Cross, John A. (1989). Flood insurance and coastal development. *The Florida Geographer*, 23, 22-45.
Keywords:
development, Florida, coastal areas, insurance
Abstract: Based on a survey of realtors in the lower Florida Keys, the author concludes that the availability of flood insurance might have contributed to an increased occupation of coastal flood zones.

Cross, John A. (1990). Longitudinal changes in hurricane hazard perception. *International Journal of Mass Emergencies and Disasters*, 8(1), 31-7.
Keywords:
Florida, risk perception, hurricanes
Abstract: Data on perceptions of the hazards associated with hurricanes, periodically collected over a 12-year period from the same sample of Lower Florida Keys residents, were analyzed to determine what changes in hazard perception and mitigation behavior had occurred. Contrary to hypotheses that concerns about hazards decline with length of residence in hazard zones, overall perceptions that both hurricane winds and flooding are problems facing local residents have

increased. Awareness of the hurricane threat remains high, with two-thirds of the residents stating that it is likely that the area will experience a damaging hurricane within the next ten years, even though a major hurricane has not occurred within the area for nearly three decades.

Crowell, Mark. (1997). Coastal erosion and the National Flood Insurance Program. *Shore and Beach*, 65, 24-6.
Keywords:
erosion, mapping, coastal areas, insurance premiums
Abstract: The National Flood Insurance Reform Act (NFIRA) was enacted into law on September 23, 1994. Section 577 of the Act requires that FEMA to submit a report to Congress that evaluates the economic impact of erosion and erosion mapping on coastal communities and on the NFIP. Section 577 follows many years of debate concerning whether the effects of erosion should be considered in mapping flood risk zones and setting rates for flood insurance.

Crowell, Mark, Stephen P. Leatherman, and M.K. Buckley. (1991). Historical shoreline change: Error analysis and mapping accuracy. *Journal of Coastal Research*, 7(3), 839.
Keywords:
erosion, mapping, coastal areas, Upton-Jones Amendment
Abstract: FEMA is assessing technical methodologies and procedures for the collection, analysis, and computation of coastal erosion rates. This assessment is being performed to determine the feasibility of generating such data for use as a basis for administering Section 544 of the Housing and Community Development Act of 1987 (commonly known as the Upton-Jones amendment to the NFIP). It is likely that the methodology selected will involve the use of historical data compared with current shoreline information. Several states use this fundamental approach to predict shoreline location based on extrapolation of past changes in developing data to support setback programs. Requirements contemplated for data development include: (a) standardization of a methodology for developing data on erosion rates; (b) consistency in application; (c) capability of being applied in a timely manner; and (d) accuracy commensurate with program needs. This paper addresses the last issue by examining sources of errors inherent in the raw data. Source data include historical and recent National Ocean Service (NOS) T-sheets (produced ca. 1840s to present) and air photos (taken ca. late 1930s to present) as well as any other types of accurate map and photographic data. A study of this nature requires extensive preparation of the required source material prior to digitization. For example, the high water line or bluff line must be identified and annotated on the air photos and maps. Furthermore, the source material must undergo extensive pre-digitization and post-data compilation accuracy checks and reliability assessments necessary to screen inaccurate maps and air photos. For example, older historical maps with obsolete coordinates must be updated to current standards and analyzed to insure that distortion has not rendered the map inaccurate and unusable. In addition, computerized techniques (e.g., metric mapping and analytical stereoplotter) or manual techniques (e.g., Zoom Transfer Scope) must be used to correct for distortion inherent in aerial photography.

Crowell, Mark, Howard Leiken, and Michael K. Buckley. (1999). Evaluation of coastal erosion hazards study: An overview. In Mark Crowell and Stephen P. Leatherman, eds. *Coastal Erosion Mapping and Management – Journal of Coastal Research Special Issue #28*. Royal Palm Beach, FL: Coastal Education & Research Foundation.

Keywords:
erosion, mapping, economic impacts, hazard identification, coastal areas, Upton-Jones Amendment, legislation, cost-benefit analysis
Abstract: This article reports on the background and details of a study to evaluate the impact of erosion and mapping of erosion on coastal communities and on the NFIP. The study known as the "Evaluation of Erosion Hazards" and required by the National Flood Insurance Reform Act of 1994 is being conducted in two phases. During Phase I, FEMA mapped 60-year erosion hazard areas in 27 counties distributed among 18 coastal and Great Lakes states. During Phase II, FEMA will conduct an inventory of structures that are located within the 60-year erosion hazard areas and current projected flood zones, analyze the economic impacts of erosion and erosion mapping and their impacts on the NFIP, and determine whether it is cost-beneficial for FEMA to map erosion hazard areas. The final report will be submitted to Congress in January 2000. Conclusions of the report will help provide closure to a long-standing debate and congressional concern as to whether FEMA should map coastal areas with erosion hazards and use these data in determining insurance premiums and land-use provisions through the NFIP.

CRTF Evaluation Committee. (1994). *Community Rating System Evaluation Planning Report*. Washington, DC: FEMA.
Keywords:
Community Rating System, strategic planning
Abstract: The Community Rating Task Force (CRTF) formed an Evaluation Committee in January 1994 to evaluate whether the CRS was on track with original expectations and to meet long-term goals. Members of the committee developed materials and reviewed preliminary analyses in order to prepare this planning report. Furthermore, the evaluation committee concentrated on laying the groundwork necessary to evaluate and answer critical questions about the CRS. This work entailed the development of components that provide the framework of a complete description of the CRS strategy, objectives, evaluation criteria, and plans for data collection. In addition to addressing the concerns of the CRTF and FEMA, the committee attempted to include concerns of other NFIP/CRS constituencies in developing evaluation plans.

CRTF Evaluation Committee. (1995). *Update to Community Rating System Evaluation Report*. Washington, DC: FEMA.
Keywords:
Community Rating System, strategic planning
Abstract: The purpose of this update to the *CRS Evaluation Planning Report* is to provide the latest schedule for carrying out the evaluation efforts, supply revisions and refinements to two major items discussed in the original document, and elaborate on some of the background of CRS and the reasoning that went into the evaluation plan.

Cuny, Frederick C. (1991). Living with floods: Alternatives for riverine flood mitigation. In Kreimer, Alcira and Mohan Munasinghe eds. *Managing Natural Disasters and the Environment: Selected Materials*. Washington, DC: The World Bank, 62-73.
Keywords:
structural approaches, riverine areas, mitigation, developing nations, socioeconomic impacts
Abstract: Most efforts designed to reduce the effects of floods have focused on such structural measures as the construction of dams and embankments (polders, levees, and the like). Many of

these large-scale, capital-intensive projects had been questioned on both technical and environmental grounds. Development experts question whether large-scale flood control projects are economically suitable for the least-developed countries since they increase the country's debt significantly for little economic return. Some flood control projects may be counterproductive. Embankments may foster unrealistic expectations that all flooding can be prevented and stimulate movement onto floodplains, thereby increasing total risk. In recent years, there has been increased interest in alternative strategies for protecting the floodplains, especially in rural areas. A key strategy has been to encourage people living in rural areas and in some small communities to adapt to floods and to capture their benefits for economic development. Traditional rural societies have developed many ways to adapt to floods and their consequences. These strategies can often be adopted or modified into a "living with floods" strategy. Where this strategy has been applied, it has been cost-effective, easy to implement, and compatible with the environment. These measures can be applied before and after floods. More important, they can be incorporated in long-term development programs at little cost

Dacy, Douglas C. and Howard Kunreuther. (1969). *The Economics of Natural Disasters*. New York, NY: The Free Press.

Keywords:
insurance, federal programs

Abstract: This book formulates a clear-cut case for developing a comprehensive system of disaster insurance as an alternative to what the authors consider to be a paternalistic federal policy. To do so, the authors searched the literature relevant to insurance for disasters. These studies and reports were primarily concerned with organizational problems during the emergency postdisaster period and only occasionally referred to economic phenomena. The authors' treatment of the economics of disaster can be conveniently divided into three parts: (a) the framework for analysis; (b) empirical evidence on short-term recuperation behavior; and (c) the capital and labor needs facing disaster areas. The authors also critically examine the federal government's role in providing disaster relief to the private sector. The Small Business Administration (SBA) was the principal agency offering low-interest loans for replacing or repairing damaged homes and businesses. The authors explore the inequities of the SBA program and suggest alternative policies for eliminating these effects. They conclude that comprehensive disaster protection under the alternative system should lead not only to a more efficient and equitable recovery but would also curtail the growth of hazard-prone areas that resulted from the existing relief program.

Daly, Christopher B. (1993). Federal flood insurance seen by critics as all wet. *The Washington Post*, February 18.

Keywords:
coastal areas, erosion, subsidies, legislation, public policy, environmental protection, takings

Abstract: This article discusses proposals by Congress to strengthen the NFIP through restrictions on coastal construction and limitations on the federal government's exposure to insurance claims. However, some critics of the NFIP would like to see the program abolished altogether. Many of these critics represent environmental concerns and believe the NFIP and other federal programs essentially subsidize beachfront housing for the affluent. Furthermore, they state that the National Flood Insurance Fund lacks the money to cover several serious storms in a short period of time. Recent debate centers on a bill that would increase pressure on

banks to make certain property owners in flood-prone areas carry flood insurance. The bill would also use penalties and incentives to direct communities to create maps showing the projected effects of erosion over 10-, 30-, and 60-year periods. The maps would mark setback zones and flood insurance would not be available within the 10-year setback. This provision most alarms representatives of the real estate industry, who argue that setback zones are tantamount to the taking of private property. Supporters of the bill say it would not stop building on the beachfront but would stop the public subsidy for such building. (Note: these setback requirements were not included in the National Flood Insurance Reform Act of 1994.)

Daniel, Heather Colleen. (2000). ***The Coastal Barrier Resources Act: Impact on Development in the Coastal Zone*****. (Master's thesis, University of Delaware).**
Keywords:
Delaware, coastal barriers, development, economic modeling, Coastal Barrier Resources Act, housing markets, insurance coverage
Abstract: This thesis examines the effect of the Coastal Barrier Resources Act (CBRA) on development in coastal Delaware. Passed in 1982, CBRA was designed to minimize loss of human life by discouraging development in high-risk areas, reduce wasteful expenditures of federal resources, and protect natural resources associated with coastal barriers. Using data from an original survey and tax data from Sussex County, the thesis explores whether CBRA has affected development (i.e., the housing market) in terms of five variables. The variables include density of development, pace of development, value of housing, information on flood insurance, and protective measures taken against storms. From this study, CBRA appears to have no negative effect on the density or pace of development or on the value of housing. The amount of insurance coverage is similar in both the CBRA and non-CBRA areas examined. However, property owners in the CBRA area pay substantially higher insurance premiums. With regards to protective measures taken against storms, property owners in the CBRA area utilized more of them, but it is unknown whether CBRA influenced these decisions. Overall, the study finds that CBRA has had minimal effect on the housing market in coastal Delaware as measured by five explanatory variables.

Daniels, R. Steven and Carolyn L. Clark-Daniels. (2000). ***Transforming Government: The Renewal and Revitalization of the Federal Emergency Management Agency*****. Arlington, VA: The PricewaterhouseCoopers Endowment for The Business of Government.**
Keywords:
strategic planning, public policy, federal programs, disaster assistance, agency operations and management
Abstract: In this study, the researchers investigated the evolution of the disaster assistance programs of FEMA from the Bush Administration to the Clinton Administration. The federal response to Hurricane Hugo, the Loma Prieta earthquake, and Hurricane Andrew revealed serious flaws in FEMA's structure and procedures. Extraordinary tensions existed between the secretive National Preparedness Directorate and the more public State and Local Programs and Support Directorate. The Bush Administration frequently bypassed FEMA and centralized response in the White House. The aAministration's response to catastrophic disasters was largely reactive. Little of the funding went toward mitigation of future disasters. The media, Congress, and several evaluative organizations including the General Accounting Office, the National Academy of Public Administration, and FEMA's OIG all underscored the shortcomings of

FEMA's structure and operations. Learning from the Bush experience, the Clinton Administration moved quickly to recast federal disaster response. President Clinton appointed James Lee Witt, Arkansas's emergency services director as director of FEMA and elevated the FEMA's director to cabinet-level status. Director Witt moved to redefine FEMA's mission, reorganize the agency around basic emergency management functions, make FEMA more consumer oriented, rebuild the staff's commitment to FEMA's mission, and redirect the focus of disaster assistance toward mitigation. Consequently, media and political criticism has diminished. However, FEMA is not free from problems. The agency still needs to address issues regarding financial management and decision criteria.

Davison, A. Todd. (1989). ***A Report on Structures Substantially Damaged by Floods in the United States (1978-1988)*****. Washington, DC: FEMA.**
Keywords:
substantial damage, substantial improvement, mitigation, compliance, pre-FIRM structures
Abstract: The Program Policy and Compliance Division of the Office of Loss Reduction prepared this internal report at the request of the Federal Insurance Administrator. The report summarizes data from the NFIP claims file on insured structures substantially damaged by floods between 1978 and 1988. For each substantially damaged structure, the claims file provided the owner's name, address, dollar amount of damage, loss date, structure value, damage as a percent of structure value, dollar amount of claim paid, and flood zone designation. Analysis of these data reveals that 18,558 insured structures have been substantially damaged for a total loss of $438,730,198. Of this, the NFIP paid $332,305,065 in claims. Further, the average substantially damaged structure incurred damages equal to 72.5 percent of its value. Several other trends emerge from the analysis. For example, 67 communities experienced 50 or more substantial damages during the period from 1978 to 1988, accounting for over one-half of all substantial damages in the nation. According to the report, FEMA and the states should concentrate technical assistance in these communities with high numbers of substantial damages. In addition, data on substantial damage could serve as an effective tool for post-flood damage assessments and various hazard mitigation programs.

Davison, A. Todd, Tim Keptner, and Mike Borengasser. (1989). ***A Report on the Results of a Questionnaire on Substantial Improvement*****. Madison, WI: Association of State Floodplain Managers.**
Keywords:
substantial damage, substantial improvement, enforcement, compliance
Abstract: As part of a joint effort to evaluate the NFIP's definition of substantial improvement and its enforcement at the local level, ASFPM and FIA distributed a questionnaire requesting comments on various issues related to substantial improvement. Seventy-three questionnaires were completed. The majority of respondents addressed the following themes related to substantial improvement in their comments: enforcement at the local level, threshold of 50 percent, guidance and dissemination of information, definition of market value, inclusion and exclusion of items in calculating cost of improvement, rewording of definition to include substantial damage and cumulative permit tracking, consistency with building codes and building practices, acceptance of alternative techniques for mitigation, and reliance on objective and defendable methods in making determinations. The report concludes with commentary on general issues raised in the questionnaires by the respondents.

Dawdy, David R. and Dennis P. Lettenmaier. (1987). Initiative for risk-based flood design. *Journal of Hydraulic Engineering*, 113(8).
Keywords:
modeling, risk assessment
Abstract: A recent report of the Interagency Advisory Committee on Water Data found that there is "no current procedure for assigning an exceedance probability to the probable maximum flood (PMF)…in a reliable, consistent, or credible manner." This conclusion was used as justification for continuation of the current, quasideterministic, PMF-based spillway design methods used by all federal agencies. This is despite criticism by both researchers and practitioners that PMF-based methods tend to lead to a false sense of security and to misallocation of resources for dam safety improvements. As an alternative to perpetuation of the status quo, the writers outline four general areas in which research should be promoted for improved estimation of extreme floods, as well as research aimed at development of a method for incorporation of risk information into spillway design. The writers believe that if the federal agencies were to promote research in the areas suggested the current stagnation that has set in would be broken, and the self-fulfilling prophecy that there are no alternatives to current practice could no longer be justified.

Dean, Cornelia. (1992). Beachfront owners face possible insurance cuts. *The New York Times*, May 27.
Keywords:
erosion, coastal areas, legislation, insurance coverage, property values, public policy
Abstract: This article reports on proposed federal legislation to limit flood insurance for coastal property at high risk from erosion. The measure has pitted environmental groups against property owners. Environmental groups assert that flood insurance has encouraged destructive and dangerous development on the nation's shores. Property owners and developers call the proposal a veiled land grab by the federal government. In exchange for continued benefits from flood insurance, the legislation would outline areas prone to erosion where new construction or substantial improvements would be limited or prohibited. In the areas of imminent erosion, property owners would receive funds to relocate or raze their buildings. If they chose to stay, then they would receive limited benefits and would lose coverage after their next claim. No one can say with certainty how much land or how many buildings the measure would affect. This is because the areas prone to erosion have not been mapped, a process estimated to take at least five years.

Decker, Richard. (1987). *National Flood Insurance Program: Insurance Operating Alternatives*. Washington, DC: FEMA.
Keywords:
agency operations and management, marketing, Write Your Own Program, insurance, insurance agents, insurance premiums, risk financing, risk management
Abstract: This report reviews the current structure and activities of FIA, expansion of the WYO Program, geographical distribution of business, costs of the various services, use of servicing carriers in lieu of a Direct Servicing Agent, and other miscellaneous matters. Several observations made in the report warrant further consideration. For example, as of January 1, 1987, 23 states had at least 10,000 policies-in-force. These states comprise 90 percent of the

program's business. With a large number of exposures subject to flooding from hurricanes in the Atlantic and Gulf Coasts, the NFIP needs a better geographic spread of risk. To that end, the author recommends a study to identify geographic areas to target and to consider the steps necessary to write more business in such areas. Another recommendation would involve the elimination of the Direct Servicing Agent and replacing it with one or more insurance companies to service agents not affiliated with a WYO company. Additional observations and recommendations appear in the report.

Deloitte & Touche. (1999). ***Evaluation of the National Flood Insurance Program's Underwriting and Loss Adjustment Processes*****.**
Keywords:
NFIP, liability, insurance claims, insurance coverage
Abstract: This report provides recommendations to improve the NFIP's operations by identifying practical changes to the underwriting/rating and claims processes and to FIA's controls. Although the NFIP's requirements and controls (and compliance with them) were found to be generally adequate to ensure effective management of the NFIP, and the degree of compliance with NFIP underwriting/rating and claims requirements is adequate, areas for improvement were noted in four major functional categories: operational/communications, underwriting, claim/loss adjusting, and financial reporting/audit. These functional areas correspond to areas in which opportunities for improvements in the process and controls areas were detected.

Deloitte & Touche. (1999). ***NFIP Financial Stabilization Project.***
Keywords:
NFIP, economic modeling, strategic planning, risk financing
Abstract: FEMA hired Deloitte & Touche to investigate alternatives to current financing from the Department of the Treasury for the NFIP. This report details the consultant's findings on risk financing and options for risk transfer, including the identification and interviewing of organizations with relevant option and commercial financing experience. The report discusses the development of a stochastic model using underlying FIA assumptions to simulate the NFIP's total financing costs over a ten-year period. The total financing activity and stabilization effect (i.e., variability) of the following eight scenarios are reviewed: (a) bank financing; (b) financial reinsurance; (c) catastrophe bonds – interest and principal at risk; (d) catastrophe bonds - interest at risk; (e) program capitalization; (f) funding the premium differential; (g) Treasury financing; and (h) capitalization from congressional appropriations. The document concludes that the first four scenarios, which involve commercial financing activities, add costs to the NFIP's operations. It also concludes that scenario iii would be the least expensive (99 percent nonexceedence level). The economic value of scenarios i and ii varied depending on the nonexceedence level reviewed. Scenario i was the least expensive at low exceedence levels due to the 100 basis-point fee charged on the unused bank facility. Scenario ii is the least expensive at the mid-exceedence levels. The remaining scenarios include congressional appropriations and assume appropriations are provided on an interest-free basis.

Dewberry & Davis and URS Greiner Woodward Clyde Federal Services. (1999). ***Economic Evaluation of Substantially Damaged Structures Funded through the Hazard Mitigation Grant Program*****. Washington, DC: FEMA.**

Keywords:
Hazard Mitigation Grant Program, mitigation, substantial damage, cost-benefit analysis, buyouts
Abstract: This report summarizes the results of cost-benefit analyses performed on structures declared as substantially damaged under FEMA's Hazard Mitigation Grant Program (HMGP). These structures have been exempted from a cost-benefit analysis since FEMA issued a memorandum in late 1996. Cost-benefit analyses were performed for 1,979 acquired structures in all ten of FEMA's regions. The analyses show the cost effectiveness of FEMA's exemption policy for each of FEMA's ten regions, with ratios of benefits to costs ranging from 1.06 to 6.10 and averaging 2.21. A supplement to the report details the information and assumptions used to perform the cost-benefit analyses for the substantially damaged structures, presents the results of a theoretical study of the effect of storm frequency on cost-benefit analysis, and supports the findings of the theoretical study with data from the cost-benefit analyses for the substantially damaged structures.

Diggins, William. (1980). Necessary decisions? Disaster mitigation policy on the local level. Paper presented at the *American Sociological Association Annual Meeting*, New York, NY, August 27-31. Washington, DC: American Sociological Association.
Keywords:
risk communication, mitigation, public policy, attitudes
Abstract: A model of administrative decision making in local communities is tested for the case of land-use and building regulations implemented to mitigate flood risks. This model implies that the extent of the problem in the community causes local decision makers to perceive the problem as being serious, this then causes appropriate decisions to be made to alleviate the problem. Multiple regression analysis of flood data from the Red Cross and interviews with 432 mayors and council members in 100 local communities shows that the extent of the flood problem in local communities has positive effects on the officials' perceptions of the extent and seriousness of the local flood problem. However, these factors have little effect on the officials' attitudes toward policies affecting the mitigation of flood risks.

Disaster Mitigation Research Working Group. (2002). *Benefits of flood mitigation in Australia: Report 106*. Canberra, Australia: Bureau of Transport and Regional Economics.
Keywords:
cost-benefit analysis, economic impacts, Australia, mitigation
Abstract: This working group examined the realized economic benefits of flood mitigation activities with a literature review, consultations with key planners, and case studies of areas with repeated past flooding. The case studies examined individual mitigation measures (land use planning, voluntary purchase, building controls, sealed roads, and levees) in specific locales and yielded quantitative data to suggest Australia's various flood mitigation measures created substantial, tangible savings. The report includes dollar amounts for each measure in each locale. At the same time, the enumerated savings reported are likely to underestimate the full benefit of flood mitigation because intangible savings (like reduced stress) cannot be quantified. More broadly, the report identified a number of important points related to the benefits of mitigation: there is a trend toward nonstructural mitigation solutions; levees appear to have been effective in preventing substantial damage; altering the way infrastructure is designed and constructed can be very cost-effective; mitigation solutions must be tailored to their location in order to be successful; community awareness and preparedness play an important role in determining the

success of mitigation; equity and perceived fairness are powerful factors in community acceptance; and finally that drainage and storm water issues are closely linked to other flood issues, regardless of the source of flooding (e.g., storm surge or cyclones).

Dixon, L.S. (1990). Inclusion of wetlands in designated floodway studies. In *Hydraulics/Hydrology of Arid Lands (H2AL)*. New York, NY: American Society of Civil Engineers.

Keywords:
environmental protection, hydrology and hydraulics, wetlands

Abstract: The traditional methods and procedures used by hydrologists and hydraulic engineers to define floodways and floodway fringe areas are changed so that designated floodways are adjusted to encompass wetlands, resulting in better protection of the nation's diminishing wetlands and a reduction in development problems due to permit requirements pursuant to Section 404 of the Clean Water Act. Hydrologic studies to define floodways and floodway fringe areas are an important tool in the management of floodplains. A minimum standard for defining floodways has been developed under the NFIP. Implementation of more stringent standards is a local community decision. By proposing the inclusion of wetlands in the determination of designated floodways, hydrologists and hydraulic engineers have an opportunity to contribute to the protection of wetlands and to assist in better defining floodway fringe areas available for development.

Donnelly, William A. (1989). Hedonic price analysis of the effect of a floodplain on property values. *Water Resources Bulletin*, 25(3), 581-6.

Keywords:
economic modeling, property values, housing markets

Abstract: The effects of a floodplain location on the market value for property are controversial, with the conventional wisdom being that buyers are myopic. Previous statistical tests have proven inconclusive in deciding the issue. Herein, a theoretical model, that of hedonic price indexes, is posited and tested, using housing sales characteristics data obtained from a Multiple Listing Service. This study suggests that home buyers do adjust the purchase price for houses within a floodplain, and this amounts to, on average, just over 12 percent. The data come from a small town in the Midwest where the last severe flooding occurred a decade ago.

Douglas, James, M. and Brad Hail. (1986). Risk information for floodplain management. *Journal of Water Resources Planning and Management*, 112(4).

Keywords
communication, risk assessment

Abstract: The United States began structural flood measures in the 1950s and added complementary nonstructural measures in the 1950s. Nevertheless, national flood damage totals continue to increase. Reversal of this trend will require better communication among regulatory agencies, experts assessing risk, and floodplain occupants. Modern technology provides tools to measure specific risks and communicate the hazards of property loss and personal dangers to individuals able to reduce the losses. One problem with the existing communication, based on a safety standard tied to the 100-year floodplain, is that some locations in the 100-year floodplain are subject to only trivial damage by shallow flooding, while other locations outside that boundary are subject to major devastation and threats of drowning by floods that could be as

common as the true 25-year event. Systematic estimation and dissemination of the risk of economic loss can reduce flood losses, vary community programs with the hazard to life and property, and help every floodplain occupant accommodate more effectively with his site-specific problem.

Downton, Mary W. and Roger A. Pielke, Jr. (2001). Discretion without accountability: Politics, flood damage, and climate. ***Natural Hazards Review*****, 2(4) 157-66.**
Keywords:
disaster assistance, public policy
Abstract: Federal disaster assistance is one component of US policy for coping with damaging floods. The president ultimately determines whether federal relief is provided to states and local communities following a disaster, yet guidelines governing the president's discretion are vague and the total federal cost of disaster assistance is difficult to determine. This study analyzes flood-related presidential disaster declarations from 1965 to 1997. It compares the annual number of flood-related declarations to measures of precipitation and flood damage, finding that presidents have differed significantly in disaster declaration policy. Annual differences in declarations during seven presidential administrations do not correspond to the president's political party affiliation. In addition, a state's ability to pay has not been a major consideration in presidential decisions about whether a disaster warrants federal assistance. However, presidential decisions are related to whether the president is running for reelection. Declarations are also related to changes in legislative and administrative policy. This article discusses the significance of these findings in the context of national policies governing floods and other disasters.

Driscoll, Paul and Michael B. Salwen. (1996). Riding out the storm: Public evaluations of news coverage of Hurricane Andrew. ***International Journal of Mass Emergencies and Disasters,*** **14(3), 293-303.**
Keywords:
Florida, Hurricane Andrew, risk communication, risk perception, media
Abstract: Residents of South Florida who experienced Hurricane Andrew evaluated the credibility of the hurricane-related information from television as more trustworthy than that from other sources. Contrary to what was hypothesized, the broadcast medium of television (but not radio) was evaluated on the dimension of expertise as being higher than newspapers. As predicted, interpersonal sources were judged high on trustworthiness, but much lower on expertise than any of the mass media sources. The findings indicate that when people wanted factual information and self-help information, they expressed reservations about the credibility of other people (friends, neighbors, or relatives). In such cases, there was a marked tendency to place emphasis (or faith) in television.

Dunn, S., R. Friedman, and S. Baish. (2000). Coastal erosion: Evaluating the risk. ***Environment,*** **42(7), 36-45.**
Keywords:
erosion, coastal areas, risk communication
Abstract: This article discusses the risk to property in the United States from coastal erosion. Coastal erosion caused by rising sea levels, large storms, and powerful ocean waves is wearing away the 10,000 miles of shoreline along US oceans and the Great Lakes and could destroy

85,000 houses over the next 60 years. In March, the H. John Heinz III Center for Science, Economics, and the Environment completed a nationwide study of the effect of erosion on the NFIP and other federal programs and on coastal communities. The findings suggest that property owners must be informed of the erosion risks that they face. Furthermore, erosion risk must be included in local land-use planning, state coastal management, and private and public lending and insurance practices.

Durrin, Robert. (1995). ***Proposal: Elevation Certificate Program – FEMA's Best Option for NFIP Community Compliance*****. Atlanta, GA: FEMA Region IV.**
NOTE: A staff member from FEMA Region IV developed this paper and his views do not represent those of FEMA Region IV or FIMA.
Keywords:
compliance, Community Assistance Visits, elevation certificates, risk management, risk perception, insurance, insurance premiums, enforcement
Abstract: Nearly 30 years since its inception, the NFIP has experienced a relatively low level of compliance and a high level of recurring problems. This report recommends the implementation of a program by FEMA and the states to collect and inventory data in order to establish compliance with the NFIP and reduce losses in flood-prone communities. Specifically, the program would involve the use of complete, current, and accurate elevation certificates on all buildings in a Special Flood Hazard Area (SFHA). An accurate and certified elevation certificate can indicate whether a community is correctly applying its ordinance and is complying with the NFIP. Furthermore, an accurate and certified elevation certificate explains the risk associated with the building so that it may be actuarially rated. The ultimate goal is for a building's insurance rate to be commensurate with its risk. In order to achieve this goal, FEMA and the NFIP must reprioritize their resources by placing new emphasis on defining risk on a building-by-building basis. In addition, the proposed program of elevation certificates will allow FEMA to identify where compliance problems exist and to solve those problems with relevant training. Attached to the report is a draft of a study on *Expedient Elevation Certificates* of pre-FIRM houses in Louisville and Jefferson County, KY, prepared by Dewberry & Davis.

Emani, Srinivas and Jeanne X. Kasperson. (1996). Disaster communication via the information superhighway: Data and observations on the 1995 hurricane season. ***International Journal of Mass Emergencies and Disasters,*** **14(3), 321-42.**
Keywords:
risk communication, risk perception, Hurricane Opal, Florida, media
Abstract: Although researchers and practitioners have been using the Internet to communicate information on disasters, few systematic studies have assessed the type of information that is or should be communicated via this medium. This paper presents an exploratory, yet systematic, study of FEMA's coverage of the 1995 hurricane season via e-mail and the Internet. An overview analysis of the 1995 season shows that FEMA distributed 184 e-mail messages of which 138 were hurricane-related and 46 were nonhurricane-related. Following this overview analysis, a case study is presented of FEMA's coverage of Hurricane Opal, which was associated with significant impacts in Florida. The focus of analysis in the case study is a type of e-mail message called the situation report (sitrep), which FEMA used to communicate information on disasters. The number, timing, and content of sitreps that FEMA issued for Hurricane Opal are analyzed and the results used to discuss the agency's communication efforts via the Internet.

European Environment Agency. (2001). ***Sustainable Water Use in Europe – Part 3: Extreme Hydrological Events: Flood and Droughts.*** **Copenhagen, Denmark: European Environment Agency.**

Keywords:
Europe, flood causes, environmental policy, public policy, mitigation

Abstract: During the 25-year period between 1971 and 1995, there were 154 major floods in Europe, and in 1996 alone there were nine flooding events. This report presents an overview of the main natural and artificial causes and impacts of extreme hydrological events, such as floods and droughts, in European countries. Flooding and its impacts are often influenced by a combination of natural factors and human interference. The main driving forces (pressures) that induce or intensify floods and their impacts include climate change, land sealing, changes in the use of catchments and floodplains, population growth, urbanization and increasing settlement, roads and railways, and hydraulic engineering measures. In addition to a discussion of these aforementioned pressures, the European Environment Agency (EEA) reviews recent floods in Europe and the structural and nonstructural responses to those floods. An appendix details specific examples of flood prevention and alleviation measures applied in Europe. The report also discusses the driving forces, pressures, impacts, and responses concerning droughts.

Evatt, Dixie Shipp. (1999). ***National Flood Insurance Program: Issues Assessment.*** **Washington, DC: FEMA.**

Keywords:
NFIP, public policy, development, floodplain management, compliance, insurance

Abstract: After 30 years, is the NFIP fulfilling its dual missions of promoting positive decisions regarding land use and of reducing the overall public portion of recovery costs due to flooding? This evaluation examined 36 studies or reports published between 1976 and 1998, which explored the relationship between floodplain development and insurance availability. The studies, which often reach contradictory conclusions, represent products of various disciplines—law, geography, sociology, and economics. None of the studies offers irrefutable evidence that the availability of flood insurance is a primary factor in floodplain development. Neither does the empirical evidence lend itself to the opposite conclusion. Taken as a whole, several themes emerge. For example, while the NFIP may not represent the primary cause of development in environmentally sensitive areas, the program does little to discourage development. Based on her review and analysis of the literature, the author recommends a comprehensive evaluation of the NFIP and a consideration of the program's central questions in the larger context of public policy.

Faber, Scott. (1996). ***On Borrowed Land: Public Policies for Floodplains.*** **Cambridge, MA: Lincoln Institute of Land Policy.**

Keywords:
Midwest floods of 1993, floodplain management, development, economic impacts, public policy, environmental policy, risk communication, mitigation

Abstract: Flooding is a natural hydrologic occurrence, but flood-related damage to property and the risks to human life are exacerbated by urban growth and other intensive development in floodplains. The conventional response has been to construct ever-larger flood control systems, but floodplains are not fixed and they defy simply structural solutions. This report summarizes

key points from a conference of policy experts and local elected officials to draw land-related lessons from the disastrous experience of flooding. The report considers ecological, economic, and legal issues of land use in floodplains through case studies of local responses to the disastrous 1993 floods in the Midwest, as well as other river basin management programs around the country.

Faber, Scott and Constance Hunt. (1994). River management post-1993: The choice is ours. ***Water Resources Update*****, 95(Spring), 21-5.**
Keywords:
Midwest floods of 1993, Mississippi River, riverine areas, environmental restoration
Abstract: Largely the result of hydrologic alterations, the upper Mississippi River basin has become destabilized and is no longer physically compatible with its climate. The river is experiencing higher and more frequent flood stages and lower flows during dry seasons. The result is an unpredictable river that can flood farmhouses miles from its normal channels during floods and render barges marooned during droughts. Due to the Midwest floods of 1993, the opportunity is in hand to reverse current watershed management and restore some of the natural conditions that made the Mississippi River an unusually rich ecosystem. This article considers the policy implications of these floods focusing on changing the funding priorities on the federal level to favor programs that enhance the ability of the landscape to retain and filter water with their floodplains and programs that provide technical and financial assistance to landowners for wetland restoration.

Faupel, Charles E., Susan P. Kelley, and Thomas Petee. (1992). The impact of disaster education on household preparedness for Hurricane Hugo. ***International Journal of Mass Emergencies and Disasters*****, 10(1), 5-24.**
Keywords:
South Carolina, risk communication, risk perception, Hurricane Hugo
Abstract: This article studies the impact of disaster education on hurricane preparedness among residents in Charleston, SC. The article examines: (a) the impact of participation in disaster education programs generally; (b) the impact of hurricane experience as a type of education; and (c) the impact of participation in earthquake specific education programs to determine whether there is any transference of knowledge across agent types. Two indices of preparedness are used: household planning activities and adaptive response activities. Participation in some type of disaster education program was strongly related to the preparedness measures. Hurricane experience had some minimal effect on adaptive response but not on household planning. Participation in the earthquake specific education programs was not a significant predictor when controlling for other variables.

FEMA. (1979). ***Economic Feasibility of Floodproofing: Analysis of a Small Commercial Building*****. Washington, DC: Government Printing Office.**
Keywords:
economic impacts, floodproofing, Pennsylvania
Abstract: The report examines the costs of floodproofing a new commercial building in Jersey Shore, PA, and concludes that floodproofing is not unduly costly. The study evaluated three potential floodproofing solutions – building raised on fill, building raised on columns, and building raised on fill with watertight enclosures – ranging in cost from $35,912 to $89,732.

Floodproofing increased the cost of construction between 6 and 16 percent. By calculating the present value of the reduction in insurance premium over 20 years, the study was able to obtain benefit/cost ratios for each of the three floodproofing solutions. The benefit-cost ratios were 5.96 for building raised on fill, 2.48 for building raised on columns, and 2.31 for the building that combined fill and watertight enclosures. Benefits were also estimated through the reduction in flood losses. Average annual flood losses – estimated at $13,834 prior to floodproofing – were reduced by from 85 to 92 percent through floodproofing solutions. The reduced need for federal flood disaster relief was not included in calculations. Findings from this case study can hopefully be approximated to the nation and provide solid evidence of the feasibility of floodproofing.

FEMA. (1979). ***The Floodway: A Guide for Community Permit Officials.*** **Washington, DC: Government Printing Office.**
Keywords:
floodway, permits, floodplain management, enforcement, compliance, mobile homes, Base Flood Elevation, development, mapping
Abstract: The purpose of the floodway is to reserve the central part of the floodplain, to ensure that some part of the floodplain will remain open to carry floodwaters efficiently. Floodway regulations are one of the most complex aspects of the NFIP. This guidebook is designed to provide community officials with an explanation of the floodway and provide guidance for regulating the floodway. Specific topics include the use of a Flood Boundary – Floodway Map, role of the development permit, evaluation of the permit, regulation of mobile homes in the floodway, and regulation of existing structures in the floodway.

FEMA. (1980). ***Alternatives for Implementing Substantial Improvement Definitions.*** **Washington, DC: FEMA.**
Keywords:
substantial improvement, enforcement, environmental impacts, economic impacts
Abstract: This study estimated the magnitude of activity related to substantial improvement and to examine the effectiveness of the regulatory approach under the NFIP in reducing flood risk to existing property. The study concludes that the magnitude of substantial improvement is quite small in relation to the magnitude of new construction. Vigorous enforcement of the NFIP's substantial improvement regulations, therefore, will not have as significant effect, in terms of overall reduction of flood damage, as will application of the NFIP's regulations for new construction. The study also concludes that for a variety of reasons, participating communities have not enforced substantial improvement regulations in regard to non damage-related improvements. This conclusion raises questions about using a regulation to reduce the potential flood damage of existing structures.

FEMA. (1980). ***Elevating to the wave crest level: A benefit-cost analysis.*** **Washington, DC: FEMA.**
Keywords:
coastal areas, Base Flood Elevation, building codes, Hurricane Frederic, cost-benefit analysis
Abstract: Prior to Hurricane Frederic, the NFIP required new construction in coastal high hazard areas to be elevated with the lowest floor at or above the storm surge stillwater level. Damage to new construction during Frederic led to an evaluation of elevating the lowest floor to the wave crest level. The engineering and economic analyses concluded that elevating a new house to the

wave crest level associated with 100-year storm surge reduces both flood loss potential and flood insurance premiums, each of which more than offsets the added costs to elevate to that height.

FEMA. (1981). ***Evaluation of Alternative Means of Implementing Section 1362 of the National Flood Insurance Act of 1968.*** **Washington, DC: FEMA.**
Keywords:
Section 1362, mitigation, buyouts, federal programs
Abstract: This study focuses principally on Section 1362 (a) of the National Flood Insurance Act, undertaking to (1) identify and explore alternative means for its implementation; (2) estimate the number of structures potentially eligible for purchase under it; (3) identify the effects of Section 1362 on individuals and communities; (4) identify its relation to other federal policies and programs; and (5) estimate the federal costs associated with the purchase of flooded properties. Acquisition under Section 1362 can assist communities to achieve their comprehensive community development goals, while simultaneously making wise use of their floodplains, correcting past mistakes in development, as well as reducing losses from floods. It is estimated that the number of properties that will become eligible and available for acquisition through Section 1362 will rise from 1,600 in 1981 to about 2,000 in 2000. In 1979 dollars the federal cost of purchasing these properties would rise from $21 to $27 million. The program should be carried out in close cooperation with states and local communities and, for greatest effectiveness, should be closely coordinated with related federal programs. (Note: the National Flood Insurance Reform Act of 1994 repealed Section 1362 and replaced it with Section 1366, which established the current Flood Mitigation Assistance (FMA) Program.)

FEMA. (1982). ***1982 Flood Hazard Management Conference Summary Report: New State and Federal Directions in the Evolving Flood Program*****. Washington, DC: FEMA.**
Keywords:
floodplain management, building codes, coastal areas, dams, development, mitigation, levees, structural approaches, nonstructural approaches, insurance, insurance claims
Abstract: This third annual conference addressed the expanding role of states in implementing the floodplain management policies of the NFIP. In keeping with the theme "New State and Federal Directions in the Evolving Flood Program," the conference endeavored to convey FEMA's concept of the current state of the program as responsibilities devolve from the federal to the state level. The plenary sessions and workshops addressed such varied topics as the recent accomplishments and future direction of the State and Local Programs Directorate and FIA, coastal issues, interstate sharing of personnel during flood disasters, floodplain management in rural areas, and how insurance and hazard mitigation complement each other. For example, participants in the workshop on floodplain management in rural areas discussed the fact that rural communities have a high percentage of unnumbered A Zones that need to be determined for purposes of floodplain management. This publication presents the minutes or summaries, in various forms, of the addresses from the plenary sessions and workshops.

FEMA. (1982). ***National Flood Insurance Programs Act.*** **Washington, DC: FEMA.**
Keywords:
NFIP, legislation, federal programs

Abstract: This publication presents an update of the consolidated laws governing all aspects of the NFIP. The document covers the program responsibilities of both FIA (insurance) and the State and Local Programs and Support Directorate (floodplain management and engineering).

FEMA. (1983). ***The 100-Year Base Flood Standard and the Floodplain Management Executive Order: A Review Prepared for the Office of Management and Budget by the Federal Emergency Management Agency*****. Washington, DC: FEMA.**
Keywords:
floodplain management, federal programs, hundred-year flood standard, compliance
Abstract: In 1982, the Office of Management and Budget (OMB) directed FEMA to investigate whether federal agencies are complying with the requirements of Executive Order 11988 and determine what impact the order is having on the level of federal support in SFHAs and to review the use of the 100-year flood standard used in implementing the order and other federal flood hazard reduction programs. This report presents a historical overview of the need for and development of a national flood hazard reduction program and a standard for implementing that program, the findings of the review of the 100-year flood standard and EO 11988, and FEMA's conclusions and recommendations based upon that review. For example, FEMA concludes that the 100-year flood standard is strongly supported and being applied successfully by all levels of government and recommends that the standard be retained. With regards to EO 11988, FEMA finds that implementation procedures have not been adopted by all agencies and some agencies have adopted procedures inconsistent with the order. FEMA recommends that these agencies with inconsistent implementation procedures should bring those into full compliance.

FEMA. (1983). ***Effect of Floodplain Regulations on Inland Port Facilities*****. Washington, DC: FEMA.**
Keywords:
ports, functional dependence, public policy, federal programs, NFIP, flood causes, mitigation, flood control, Missouri, Oklahoma, Mississippi
Abstract: This study examines the relationship between the objectives of the NFIP and Executive Order (EO) 11988 and the need for the development of inland ports. The central issue investigated is that some structural components of river ports and terminals require siting within the floodplain in order for the port to function (i.e., functional dependence). The study is based on the collection and analysis of available data pertaining to legislation, flood insurance, flood losses, inland ports and their operations, mitigation, economics, and hydraulics, and both perceived and experienced conflicts. Furthermore, consultation with FEMA resulted in the selection of the ports of St. Louis, MO; Tulsa, OK; and Greenville, MS, as case studies. Several conclusions and recommendations emerge from the analysis. For example, the objectives of the NFIP and EO 11988 and the economic need for the development of facilities for inland ports are compatible. Numerous areas of potential conflict exist between the NFIP and the development of ports. These arise for the jurisdictional and administrative complexity of managing inland waterways, the competition for limited resources from the floodplain, the demonstrated functional need of some port-related activities on proximity to water, and the complexity of the regulatory process itself.

FEMA. (1983). ***Improving the Flood Insurance Study Process*****. Washington, DC: FEMA.**
Keywords:

flood insurance studies, mapping
Abstract: The Committee on Flood Insurance Studies Research of the National Research Council's Advisory Board on the Built Environment reviewed the NFIP's operations and concluded that considerable progress has been made but that there exist many operational concerns related to the need for: (a) continuation of flood insurance studies and mapping in areas not yet studied; (b) restudy of areas previously studied; (c) improved flood insurance study products; and (d) more economical and efficient methods for the preparation of flood insurance studies and restudies.

FEMA. (1986). ***Closed-Basin Lake Flooding: Case Studies and Mitigation Opportunities*****. Denver, CO: FEMA Region VIII.**
Keywords:
closed-basin lake flooding, hazard identification, mapping, mitigation, Minnesota, Utah, North Dakota, California, Oregon
Abstract: The disaster declarations of 1983 and 1984 in Utah introduced FEMA Region VIII to the problems posed by closed-basin lakes. In the summer of 1985, FEMA Region VIII began an investigation of the causes, effects, and approaches to mitigating the problems caused by lakes with inadequate or no outlets. The region selected the best known and documented cases for analysis including Lake Pulaski, MN; the Great Salt Lake, UT; Devils Lake, ND; Lake Elsinore, CA; the Salton Sea, CA; and Malheur Lake, OR. Lake flooding poses problems across the nation—not solely to the West. Without a concerted management effort, losses attributable to closed-basin lakes will likely exceed $1 billion by 2000. Most important, successful mitigation programs have been developed and appear to be transferable. Recommendations are made for follow-up through a joint effort of FEMA Region VIII and the Association of State Floodplain Managers. The recommendations involve (1) continuing research into the most effective ways to identify the lake-rise hazard and mitigate its effects, especially as the lake is rising, but before serious damages occur; (2) determining the relationship between long-term climatic variations and lake-rises; (3) selecting additional case studies for analysis; and (4) assisting local decision-makers in addressing lake-rise issues.

FEMA. (1986). ***National Flood Insurance Program: Community Compliance Program Guidance*****. Washington, DC: FEMA.**
Keywords:
compliance, enforcement, floodplain management
Abstract: This manual provides guidance to FEMA personnel involved in ensuring that participating communities are administering their flood loss reduction programs in compliance with NFIP criteria. It offers procedures for taking enforcement actions against noncompliant participating communities as well as noncompliant individual structures.

FEMA. (1988). ***Maine lender compliance with the Flood Disaster Protection Act of 1973: An analysis of flood insurance purchase requirements for April 1987 flood disaster victims.*** **Boston, MA: FEMA Region I.**
Keywords:
lending institutions, mandatory purchase, Maine, communication
Abstract: On April 9, 1987, the President declared a disaster as the result of severe flooding in Maine. Following this declaration, 2,332 disaster victims applied for disaster assistance through

FEMA Region I's Disaster Assistance Program Division. Out of this total number, 613 applications came from personal or commercial properties located in Special Flood Hazard Areas (SFHA). After paring down the sample, FEMA examined 94 properties and found that only 12 of them had flood insurance at the time of mortgage closing. FEMA cites the following reasons for lender noncompliance based on its analysis: (1) human error on the part of the lender when reading the FIRM; (2) legitimate differences in interpretation of the FIRM for borderline properties; (3) the lender opted not to require flood insurance for borderline properties out of consideration for the limited income of some of the property owners; (4) ignorance on the part of lender concerning the flood insurance purchase requirements; (5) the lender ignored the flood insurance purchase requirements; and (6) a lack of follow-up enforcement by the lender when policies expired. Furthermore, FEMA makes several policy proposals to improve lender compliance which include: (1) requiring property owners to provide mortgage information when they apply for disaster assistance; (2) widening NFIP's information loop; (3) targeting lenders for participation in the Lender Workshop Program; (4) incorporating a "Lender Education Visit" into Community Assessment Visits; and (5) regularly updating, publishing, and distributing Community Status Lists.

FEMA. (1988). ***National Flood Insurance Program: Report on Existing Manufactured Home Parks and Subdivisions.*** **Washington, DC: FEMA.**

Keywords:

mobile homes, compliance, enforcement

Abstract: This report addresses the impacts of an NFIP regulation that requires a manufactured home placed in an existing manufactured home park or subdivision be elevated to or above the 100-year flood elevation to reduce damages from flood and threats to public safety. Prior to October 1, 1986, these manufactured homes had been exempt from this requirement. The report evaluates alternatives to this requirement that would achieve the same purposes, but with lesser impacts on the manufactured home community. Based on the evaluation, FEMA selected an alternative that would (1) end the "grandfathering of new and replacement units in existing parks at the conclusion of a ten-year transition period (October 1, 1999); (2) during the transition period, require elevation of units placed on sites on which a manufactured home has been substantially damaged by a flood; (3) during the transition period, require development of evacuation plans for each existing flood-prone manufactured home park; (4) encourage communities to implement additional measures to reduce flood risks in existing parks through the deducting of insurance premiums; and (5) revise the definition of "manufactured home" to allow communities the option of excluding recreational vehicles, which are fully licensed and highway ready or which are on site for less than 180 consecutive days. FEMA projects this alternative will likely impact existing parks subject to the most frequent and/or severe flooding.

FEMA. (1988). ***Review of FEMA's Procedures and Practices for Awarding, Monitoring, and Closing Flood Insurance Study Contracts and Interagency Agreements.*** **Washington, DC: Office of Inspector General, FEMA.**

Keywords:

flood insurance studies, agency operations and management

Abstract: The OIG conducted this review to determine if FEMA's Office of Acquisition Management (OAM) and FIA complied with pertinent federal procurement regulations and procedures in awarding and administering contracts and interagency agreements for flood

insurance studies. Other federal agencies and private architect-engineer (A/E) firms generally perform flood insurance studies. The audit reviewed the following areas: publicizing contractual actions, evaluating A/E proposals, negotiating A/E contracts, negotiating project orders under interagency agreements, monitoring study performance, and closing A/E contracts. Results indicate the need for improvement so that the awarding and administration of contracts for flood insurance studies and project orders under interagency agreements comply with applicable procurement regulations. For example, synopses of proposed contract actions did not contain specific information required by federal procurement regulations. To correct this situation, OAM should ensure that synopses for each proposed contractual action follow the publicity regulations of the Federal Acquisition Regulations System (FARS). Furthermore, FEMA failed to complete some A/E contracts in a timely manner. The OIG recommends OAM develop and implement a plan for eliminating the backlog of contracts requiring closeout. Additional findings and recommendations appear in the report.

FEMA. (1989). ***Guidance for Conducting Community Assistance Contacts and Community Assistance Visits.*** **Washington, DC: FEMA.**
Keywords:
Community Assistance Program, Community Assistance Contacts, floodplain management, Community Assistance Visits
Abstract: This manual provides guidance to FEMA employees, states, and other federal departments and agencies conducting Community Assistance Contacts (CACs) and Community Assistance Visits (CAVs) under the NFIP's Community Assistance Program (CAP). The major objective of the NFIP's CAP is to ensure that communities participating are achieving the program's objectives for the reduction of flood losses. FEMA uses CACs and CAVs to identify floodplain management issues and opportunities to assist communities' management of their floodplains.

FEMA. (1989). ***National Flood Insurance Program: A Cost-Effective Plan for Flood Studies Maintenance*****. Washington, DC: FEMA.**
Keywords:
mapping, agency operations and management, strategic planning, flood insurance studies
Abstract: Historically, FIA has relied on the (flood insurance) restudy, map revisions, and map amendments to ensure that the data in studies and maps are up to date and that the studies and maps accurately reflect existing flood hazards. In preparation for entering the maintenance phase of the NFIP, the Office of Risk Assessment (ORA) has assessed future requirements for flood insurance restudies (RFISs) and for map revisions and amendments. From that assessment, ORA has developed a transition plan that will allow FIA to meet the needs of the maintenance phase of the NFIP through a smooth transition from the phase of initial studies. The plan consists of balancing the personnel and financial requirements for the transitional activities. By FY 1996, ORA estimates the budget for flood studies and mapping will stabilize at $26.5 million, a figure that is $10 million less than the current budget. Using historical statistics and empirical models, ORA has estimated the number of RFISs, revisions, and amendments that FIA must process under the full maintenance phase of the NFIP, which will begin in FY 1992. The projected yearly totals for the various maintenance activities are 120 RFISs, 60 existing restudies of data, 210 Limited Map Maintenance Program (LMMP) revisions, 165 appellant-initiated physical map revisions, 1,740 Letters of Map Revision, and 455 Letters of Map Amendment. Furthermore, the

total number of contractors required once the maintenance phase has fully begun is expected to decrease from 166 in FY 1988 to 102 in FY 1992.

FEMA. (1991). ***Detailed Chronology of Significant National Flood Insurance Program Events.*** **Washington, DC: FEMA.**
Keywords:
NFIP, history, legislation
Abstract: This document contains a comprehensive but concise chronology of significant events affecting the NFIP. Events appear briefly summarized in the document by month and year of occurrence. The chronology begins with the passage of the Federal Flood Insurance Act in August 1956 and ends with the initiation of the Mortgage Portfolio Protection Program (MPPP) in January 1991.

FEMA. (1991). ***Answers to Questions About Substantially Damaged Buildings*****. Washington, DC: FEMA.**
Keywords:
compliance, enforcement, substantial damage, substantial improvement, building codes, permits, zoning, property values
Abstract: The enforcement of the substantial improvement requirement as defined in the NFIP regulations (44 *Code of Federal Regulations,* 59.1) frequently becomes a major concern for local officials after a community has experienced serious damages as a result of a flood or other disaster. In particular, community officials ask many questions concerning permits issued for the repair of damaged structures. The purpose of this document is to answer many of the questions regarding FEMA regulations and policy on substantial improvement as it applies to damaged structures. The questions and answers in this booklet should serve as guidance for local building inspectors, zoning administrators, and other permit officials that enforce the floodplain management requirements of a community participating in the NFIP.

FEMA. (1991). ***Flood Risk Directories: Applications for the NFIP*****. Washington, DC: FEMA.**
Keywords:
agency operations and management, floodplain management, mapping
Abstract: The Flood Risk Directory (FRID) represents a powerful information tool, providing the linkage between addresses and FIRMs. The benefits of FRID's applications, both internal and external to FEMA, can be expected to far exceed the costs associated with the production of the system. Among the major benefits of FRID will be its application as a marketing tool. These applications will, for the first time, allow FIA to identify properties at risk from flooding but which do not have a flood insurance policy. This report, while set in the general framework of the conversion of the NFIP's mapping and engineering to an automated format, focuses on the costs, benefits, and applications of FRID. The following applications of FRID are discussed in the report: processing of Letters of Map Amendment for single lots, risk inspection program, rating and actuarial functions, grandfathering, analysis of data on repetitive losses, marketing, CAVs and CACs, insurance agents, CRS, disaster assistance and disaster field offices, and regional offices. The Office of Risk Assessment (ORA) proposes to move ahead with the development of approximately 20 FRIDs during FY 1992. Prior to the end of FY 1992, ORA will reevaluate the practicality and utility of FRIDs for the applications discussed in the report

and will then, based on the reevaluation, make a recommendation to FIA's Policy Committee to continue or abandon the production of FRIDs.

FEMA. (1991). ***Projected Impact of Relative Sea Level Rise on the National Flood Insurance Program*****. Washington, DC: FEMA.**

Keywords:

sea-level rise, environmental impacts, climate change, floodplain management, hundred-year flood standard, insurance, coastal areas, mapping

Abstract: This report contains the findings and conclusions concerning how a rise in relative sea level would impact the NFIP. Based on information recently released by the United Nations on the range in the magnitude of potential rise in sea level, the report examines two primary scenarios: a 1-foot and a 3-foot increase by 2100. Under both scenarios, the elevation of the 100-year flood would be expected to increase by the amount of the change in sea level. Estimates indicate the area inundated by the 100-year flood would increase from approximately 19,500 square miles to 23,000 square miles for the 1-foot scenario, and to 27,000 square miles for the 3-foot scenario. The region most significantly affected would be the Louisiana coast, where subsidence rates of 3 feet per century would compound the impact of global changes in sea level. Assuming current trends of development continue, the increase in the expected annual flood damage by 2100 for a representative insured property subject to sea level rise is estimated to increase by 36-58 percent for a 1-foot rise, and by 102-200 percent for a 3-foot rise in sea level. Given the possibility for significant impacts of sea level rise in the long term, the report recommends that FEMA should (1) continue to monitor progress in the scientific community regarding projections of future changes in sea level and consider future studies on potential impacts to the NFIP; (2) consider the formulation and implementation of measures that would reduce the impact of relative rise in sea level along the Louisiana coast; and (3) strengthen efforts to monitor development trends and incentives of the CRS that encourages measures which mitigate the impacts of sea level rise.

FEMA. (1992). ***Audit of Flood Insurance Mapping Activities*****. Washington, DC: Office of Inspector General, FEMA.**

Keywords:

mapping, agency operations and management, risk communication, communication

Abstract: The OIG conducted this audit to determine the efficiency and effectiveness of FIA's flood mapping activities. These activities include the (1) process for determining where to conduct restudies; (2) preparation of map information; and (3) distribution of maps and map changes. Findings from the audit suggest that FIA can improve the cost efficiency and cost effectiveness in developing data on flood risks, preparing map information, and providing this information to users. One problem encountered during the audit concerns FIA not receiving the most benefit from its selection of maps to restudy. A FIA policy requires regional offices to compute a benefit cost (B/C) ratio for each candidate to restudy and then rank each candidate based on its ratio. Generally, the regional offices have not followed the criteria to rank B/C ratios. The OIG recommends FIA reassess the policy for ranking priorities to ensure the restudy of areas with greatest need and monitor compliance with the restudy policy at headquarters. The audit also revealed that map users are not always aware of changes made to flood maps. This can result in erroneous flood zone determinations and incorrectly underwritten flood insurance policies. FIA did not publish over 10,200 map amendments made between 1984 and January

1992. FIA has an obligation to publish current flood data, regardless of whether it includes or excludes structures. Recognizing this obligation, the OIG recommends that FIA publicize the availability of the data on amendments already developed and prepare a plan to provide data on amendments on a regular basis.

FEMA. (1992). ***Audit of the Mortgage Portfolio Protection Program*****. Washington, DC: Office of Inspector General, FEMA.**

Keywords:

mandatory purchase, Write Your Own Program, insurance coverage, lending institutions, flood zone determinations

Abstract: This report presents the results of an audit of the Mortgage Portfolio Protection Program (MPPP). FIA created the MPPP in January 1991 to provide mortgage lending and servicing companies with an additional tool to bring their portfolios into compliance with the mandatory purchase requirements of the Flood Disaster Protection Act of 1973. The goal of the MPPP is to encourage owners to buy a standard insurance policy through the NFIP. To conduct the audit, the OIG spoke with parties involved with flood insurance including officials from Write Your Own (WYO) insurance companies, lending institutions, federal mortgage regulators, and FEMA. Based on the information collected, the OIG concludes that the MPPP is a potentially valuable tool to bring mortgage portfolios into compliance with the Flood Disaster Protection Act of 1973. Nonetheless, questions remain regarding the legality of requiring flood insurance on structures remapped into a SFHA and the accuracy of flood zone determinations. To achieve the desired end, the OIG recommends FIA do the following: advocate a change in proposed legislation under consideration by the Congress to require the purchase of flood insurance whenever a structure, secured by a mortgage, is in a SFHA; proceed to develop and publish standards for flood zone determinations; and develop additional measures effectiveness of the MPPP, including the number of standard policies that are force placed into the NFIP as a result of MPPP notification letters.

FEMA. (1992). ***Report on the Substantial Damage Workshop – Ocean City, MD, December 11-13, 1991*****. Washington, DC: FEMA.**

Keywords:

substantial damage, substantial improvement, floodplain management, mitigation, insurance coverage

Abstract: FEMA convened a workshop to review the extent to which substantially damaged buildings were not brought-up to post-FIRM standards or re-rated as post-FIRM buildings and to recommend changes to NFIP policies and procedures. The NFIP is faced with a large percentage of substantially damaged buildings that are neither rebuilt to post-FIRM standards nor re-rated as post-FIRM buildings. Furthermore, different actors use different methods to determine substantial damage. An actor can manipulate damage costs and building values to achieve a desired outcome. Based on these and similar conclusions, participants recommended several potential solutions. For example, participants would support intensive assistance and additional staff to permit officials following a flood. Participants would also support a simplification of the definition of substantial damage to make it more consistent with current practices.

FEMA. (1993). ***Audit of Flood Insurance Reinspection Activities*****. Washington, DC: Office of Inspector General, FEMA.**

Keywords:
insurance claims, Write Your Own Program, agency operations and management
Abstract: The primary goal of FIA's reinspection program is to ensure that claims are properly paid. This report finds that the program is not accomplishing its goal. Specifically, procedures to reinspect claims written by Write Your Own (WYO) companies are much more lenient than those used for direct claims, and the number of WYO claims reinspected is much smaller than that for direct claims. Moreover, FIA does not have an effective internal control system to track or monitor the results of reinspections. The report therefore recommends that FIA use uniform reinspection procedures for a test period to demonstrate the effect of using different procedures, increase the number of WYO claims inspected, and have WYO companies notify FIA within a few days of a claim filing to allow FIA to reinspect the claim before payment. Furthermore, the report recommends that FIA develop policies and procedures to track recommended claim adjustments and any subsequent repayments.

FEMA. (1994). ***Audit of FEMA's Mitigation Programs.*** **Washington, DC: Office of Inspector General, FEMA.**
Keywords:
mitigation, agency operations and management
Abstract: This report covers the audit of FEMA's and selected states' mitigation activities. It addresses initiatives to make mitigation a priority, obstacles to overcome, and suggestions for improving mitigation activities. The audit concludes that an effective mitigation strategy depends on state and local governments being willing and able to plan and fund such activities. All administrations and directorates within FEMA need to cooperate as do other federal agencies with responsibilities for mitigation. More streamlining of postdisaster grants can be achieved. Recovery programs need to emphasize mitigation. FEMA should develop measures of effectiveness for and encourage innovative approaches to mitigation programs.

FEMA. (1994). ***Mitigation of Flood and Erosion Damage to Residential Buildings in Coastal Areas.*** **Washington, DC: FEMA.**
Keywords:
coastal areas, erosion, mitigation, nonstructural approaches, floodproofing, building codes, Upton-Jones Amendment
Abstract: This report documents the broad range of nonstructural mitigation activities undertaken by communities exposed to coastal flooding and erosion and provides necessary documentation on which to base a federal, state, or local mitigation program. FEMA's investigation revealed that many homeowners in coastal areas have floodproofed over the last several decades and, based on current construction activity, this trend continues. The elevation of homes in place and the relocation of homes to safer locations represent the primary means of floodproofing. FEMA found that in areas subject to significant wave action, elevation that keeps the lower area open and free of obstruction is the only in-place measure that can prevent structural damage. In areas subject to significant storm-induced scour (vertical erosion), residences whose foundations are not embedded well below the potential scour zone incur significant damage or total loss as a result of foundation failure. In areas subject to significant shoreline retreat over the long term (horizontal erosion), relocation and demolition are the only viable measures to floodproof unless actions are taken to forestall the erosion. Significantly,

FEMA's investigation confirmed that floodproofing can avert flood insurance claims and disaster assistance payments, thereby reducing federal expenditures.

FEMA. (1995). ***Audit of the Enforcement of Flood Insurance Purchase Requirements for Disaster Aid Recipients.*** **Washington, DC: Office of Inspector General, FEMA.**
Keywords:
disaster assistance, public assistance, mandatory purchase, enforcement
Abstract: FEMA's OIG audited the enforcement of the mandatory purchase requirements for recipients of grants from the Individual and Family Grant (IFG) Program and the Public Assistance (PA) Program. The audit of two FEMA regions revealed a low compliance rate. According to the OIG, FEMA does not effectively identify and monitor those grant recipients required to purchase and maintain flood insurance because the agency does not have clear, consistent policies and procedures on how to identify and enforce the requirements. IFG and PA workers need better training and assistance from FEMA to help them enforce the purchase requirements, a responsibility primarily handled by the states. Furthermore, enforcement problems arise because the IFG and PA programs do not highly prioritize mandatory purchase. In addition to activities currently undertaken by FEMA to increase compliance, the audit offers the following recommendations, among several others: develop guidance to enforce the flood insurance requirement for both the IFG and PA programs, ensure adequate training for state IFG and PA staff to understand and implement enforcement procedures, and continue plans to implement group flood insurance.

FEMA. (1995). ***Audit of the Accuracy of Flood Zone Ratings*****. Washington, DC: Office of Inspector General, FEMA.**
Keywords:
insurance premiums, mapping, agency operations and management
Abstract: This audit found that at least 27 percent of the policies in the sample had zone misratings and that 10 percent had incorrect premiums. Accordingly, the report concludes that FIA needs to improve its internal controls by expanding its review programs to include verification of rating factors. An obstacle to this is the complexity of the rating process, particularly the policy of administrative grandfathering. The report recommends assessing the impact of eliminating administrative grandfathering, and, if feasible, to begin phasing it out. It further recommends the establishment of a quality control program to monitor the accuracy of premium ratings and to identify problem areas. This will require improving the accuracy and content of FIA's database on flood insurance policies. Lastly, the report recommends that the Mitigation Directorate establish a committee that includes map users to review mapping procedures and determine cost-effective ways to increase the detail on FIRMs to make them easier to use.

FEMA. (1995). ***Audit of FEMA's Disaster Relief Fund*****. Washington, DC: Office of Inspector General, FEMA.**
Keywords:
disaster assistance, public assistance, agency operations and management
Abstract: This report presents the results of the OIG's audit of FEMA's Disaster Relief Fund. The audit concentrated on the fund's financial management and on issues that offer an opportunity for improving operations and reducing costs. Six chapters of the report examine

reliability of financial data, appropriateness of expenditures, management of grants, management of disaster loan programs, economy and efficiency of operations, and effect of increased cost sharing. The audit revealed several flaws in FEMA's management of the fund. For example, budget requests are flawed because they are based on unreliable financial data and on imprecise projections of disaster costs. The OIG recommends correcting this situation by developing a quality assurance program, including supervisory review, to ensure the support, accuracy, and reliability of data entered into and reported by the new Integrated Financial Management Information System. According to the audit, FEMA has awarded Public Assistance grants totaling billions of dollars to thousands of grantees without an adequate system to ensure the proper use of funds. Assigning certain administrative functions to agency's Office of Financial Management would improve the management of grants. The Response and Recovery (R and R) Directorate would continue to have operational responsibility.

FEMA. (1995). ***Community Rating System – Literature Review: Outreach Methods*****. Washington, DC: FEMA.**
Keywords:
Community Rating System, marketing, media, communication
Abstract: Through CRS outreach projects, communities earn credit for advising people of the flood hazard, the availability of flood insurance, and/or flood protection methods. Research has proven that awareness of the hazard is not enough; people need to be told what they can do about it. Credit for outreach projects is based on both the type of project and the topics covered. This report presents a literature review conducted by Human Technology, Inc. (HT) for FEMA. Based on HT's research, effective public outreach materials must: be developed using simple, easily understood language; disclose factual information; be credible; be designed specifically for the targeted audience; involve the target audience; be positive; show that the audience has control over changing their behavior; and be presented in a meaningful way.

FEMA. (1995). ***Disaster Assistance: A Guide to Recovery Programs.*** **Washington, DC: FEMA.**
Keywords:
disaster assistance, federal programs, Flood Mitigation Assistance Program, Hazard Mitigation Grant Program, NFIP, Community Assistance Program, Small Business Administration
Abstract: In a major or catastrophic disaster, the Federal Response Plan (FRP) will likely be activated. The FRP describes resources federal agencies can mobilize to support emergency and live-saving functions if the response capabilities of state and local government are overwhelmed. It outlines planning assumptions, policies, operational concepts, and organizational structures. This interagency publication summarizes federal programs that provide recovery assistance. The information is intended to serve as a starting point for disaster workers and local, state, and federal officials to locate sources of help as they seek more definitive information, such as eligibility criteria and application processes. Included are programs that make financial assistance available, as well as those that provide technical assistance and/or goods and other services. Program summaries are organized in two sections: (1) specific agency programs that exist for the express purpose of aiding disaster victims (disaster-specific programs) and (2) regular agency programs that may be applied to disaster recovery under special circumstances (disaster-applicable programs).

FEMA. (1995). ***The Fifty Percent Rule: The Eligibility of Facilities for Replacement Under 44 CFR 206.226(d)(a)*****. Washington, DC: FEMA.**
Keywords:
substantial damage, legislation
Abstract: This document covers the interpretation of FEMA's regulations that govern the cost of replacement for damaged facilities. The regulation states that a facility is considered repairable when disaster damages do not exceed 50 percent of the cost of replacing a facility to its pre-disaster condition, and it is feasible to repair the facility so that it can perform the function for which it was being used as well as it did immediately prior to the disaster. According to FEMA, determining the eligibility of a facility for replacement will be calculated using the following formula: the cost of repair of the disaster damage (repair of the damaged components only, using present day materials and methods) divided by the cost of replacement of the facility with a facility of equivalent capacity, using current codes for new construction. If this calculation is greater than 50 percent, then replacement is considered to give a better return on the taxpayers' investment and is thus eligible for funding.

FEMA. (1995). ***Guidelines and Specifications for Wave Elevation Determination and V-Zone Mapping*****. Washington, DC: FEMA.**
Keywords:
coastal areas, zoning, mapping, modeling
Abstract: Coastal communities generally have unique flood hazards because of storm surges and wave action from large open water bodies. Defining Coastal High Hazard Areas (V Zones) requires determination of wave elevations associated with the 100-year flood. FEMA compiled these guidelines to specify technical policies and procedures to be employed in the preparation of coastal Flood Insurance Studies (FISs) and restudies. The guidelines provide unified instructions on the application of the methodologies used to determine the coastal flooding elevation hazards set forth in the FIS, and on the delineation of the flood elevations and hazards on the FIRM. The guidelines are not applicable to studies of the Great Lakes because those coastal areas require different analytical procedures and computer models.

FEMA. (1995). ***Managing Floodplain Development in Approximate Zone A Areas: A Guide for Obtaining and Developing Base (100-year) Flood Elevations.*** **Washington, DC: FEMA.**
Keywords:
mapping, riverine areas, zoning, Base Flood Elevation, Special Flood Hazard Areas
Abstract: This guide was developed for use by community officials, property owners, developers, surveyors, and engineers who may need to determine Base Flood Elevations (BFEs) in special flood hazard areas (SFHAs) designated as approximate Zone A on Flood Insurance Rate Maps (FIRMs). One of the primary goals of this document is to provide a means to determine BFEs at a minimal cost. This guide is primarily intended for use in riverine and lake areas where flow conditions are fairly uniform (i.e., are not subject to unique flood hazards). The guide is not appropriate for use in Zone V (velocity) areas or coastal Zone A areas that are subject to flooding due to storm surge from hurricanes and other coastal storms.

FEMA. (1995). ***Options for Reducing Public Assistance Program Costs.*** **Washington, DC: Office of Inspector General, FEMA.**
Keywords:

public assistance, agency operations and management
Abstract: This inspection discusses potential cost reductions through changes to eligibility criteria for public assistance grants. Options are presented in the four primary areas: building codes and standards, repair versus replacement, private nonprofit organizations, and alternate projects. These options include amending the Stafford Act to limit funding to the federal estimated cost of returning a facility to its predisaster condition regardless of code requirements, to eliminate public assistance grants for private nonprofit organizations, and to eliminate the opportunity to accept reduced funding to use public assistance grants for alternate projects. The report also concludes that revising FEMA's regulations to raise the cost repair threshold, which triggers replacement of a public facility, could reduce costs. In addition, the inspection identifies cost saving opportunities achieved from shortening the appeals process, depreciating building contents when calculating replacement costs, and converting eligibility for publicly owned parks, recreational facilities, and income producing facilities from public assistance grants to federal loans.

FEMA. (1996). *CRS Study of Community Compliance ("No Cert" Draft)*. Washington, DC: FEMA.
Keywords:
Community Rating System, compliance, elevation certificates, insurance coverage
Abstract: This study determines if certain types of buildings built in certain years have a high probability of being compliant, post-FIRM buildings, thereby making it feasible to implement an option to write a flood insurance policy without an elevation certificate (i.e., a "no cert" option). The project collected data from a random sample of over 1,400 buildings located in communities participating in CRS. GPS technology was used to obtain accurate information on the elevations of the lowest of floors on the buildings sampled. This information was then compared with the BFE currently in effect and in effect at the time of construction to determine rates of compliance. Construction built after the community joined CRS and buildings constructed on slabs, on open stilts, and on crawlspaces exhibited the best rates of compliance. The statistical analysis of compliance for buildings on slab showed a statistically significant difference between pre- and post-CRS construction. The other two building types did not show a significant difference. The possibility for "no cert" rating depends on whether FIA can devise underwriting procedures that prevent clearly noncompliant buildings from slipping into a rating class without receiving a standard rating (i.e., based on elevation) and whether adequate monitoring of community compliance exists to keep only the best performing communities in CRS.

FEMA. (1996). *Federal Insurance Administration: 1996 Stakeholder's Report*. Washington, DC: FEMA.
Keywords:
NFIP
Abstract: This report provides an annual update on the status of the NFIP, detailing activities on policies, claims, and floodplain management. As of fiscal year 1996, the NFIP included 3,546,050 policies in 18,550 communities. The NFIP has over $369 billion of flood insurance in force. One of the program initiatives developed in fiscal year 1996 was the Group Flood Insurance Policy (GFIP), a program for individuals who apply for disaster assistance following a Presidentially declared disaster. Recipients are required to purchase coverage as a condition of the grant. 1996 also marked the first year of the *Cover America* campaign, designed to increase

awareness of flood insurance. In the first year of the campaign, *Cover America* reached close to 135 million people through advertising and public relations efforts.

FEMA. (1996). ***Hurricane Opal in Florida: A Building Performance Assessment.*** **Washington, DC: FEMA.**
Keywords:
Hurricane Opal, Florida, building codes, mitigation
Abstract: This report presents the findings of the Building Performance Assessment Team (BPAT) regarding building successes and failures during Hurricane Opal in Florida in 1995. BPAT found that utilities, such as electrical meters, panels, boxes, and wiring were routinely placed below a building's lowest habitable floor, rendering the equipment vulnerable to storm surge, wave, debris, and overwash. Furthermore, many new, single-family structures had been constructed above or adjacent to portions of older, pre-FIRM structures and probably resulted from efforts to expand and/or reconstruct older, smaller structures. Based on its findings and conclusions, BPAT makes several recommendations including but not limited to, the location of all utility components (including electric meters) on the landward side of the structure and the improvement of the quality of new construction through superior design, construction, permitting, plan review, and inspection.

FEMA. (1996). ***The Community Rating System of the National Flood Insurance Program: A Report to the U.S. Congress from the Federal Emergency Management Agency*****. Washington, DC: FEMA.**
Keywords:
Community Rating System
Abstract: The CRS was implemented in 1990 with three goals: to reduce flood losses, to increase awareness of flood insurance, and to promote more accurate insurance rating. This biennial report is submitted pursuant to the National Flood Insurance Reform Act of 1994 and provides an analysis of the program's cost-effectiveness, a description of the program's accomplishments and shortcomings, and any recommendations for pertinent legislation. One section of the report discusses improvements made to the program in the area of customer service. For example, FEMA replaced the CRS Application with a Short Form Application to simplify the application process. FEMA also revised the 1995 version of the CRS Coordinator's Manual to reflect additional goals established by the Reform Act of 1994. The final section of the report presents the various efforts undertaken by FEMA to evaluate the effectiveness of the program with extensive discussion on the survey of local officials in 1996. Overall, preliminary analysis indicates that CRS is working as intended and that the program is achieving its goals.

FEMA. (1996). ***Unintended Consequences: The High Cost of Disaster Assistance for Park and Recreational Facilities*****. Washington, DC: Office of Inspector General, FEMA.**
Keywords:
park and recreation facilities, flood damage, agency operations and management
Abstract: This report focuses on six areas that accounted for considerable disaster grants for park and recreational facilities between FYs 1989-95: debris removal, building damage, revenue-generating facilities, marinas, golf courses, and tree and shrub replacement. The report discusses options for reducing costs in these areas and the associated impacts their implementation would incur. The options discussed include: (a) limiting funding for park and recreational facilities to

debris removal only; (b) limiting funding to the repair/replacement of recreational buildings only; (c) excluding revenue-generating facilities from receiving any grant funding; (d) eliminating funding for marinas and golf courses with the exception of debris removal; and (e) eliminating funding for trees, shrubs, and other planting replacement for all recreational facilities other than parks. The report makes no recommendations.

FEMA. (1997). ***CRS Floodplain Resident Protection Survey*****. Washington, DC: FEMA.**
Keywords:
Community Rating System, marketing, media, communication
Abstract: Residents from five CRS and five non-CRS communities were contacted to assess whether CRS credited outreach activities are educating residents about the flood hazard and motivating them to take action to protect themselves and their property. The survey matched the five CRS communities and five non-CRS communities based on similar demographics, flood history, and flooding hazards. A minimum of 50 floodplain residents from each of the ten communities was interviewed. This report presents findings from the 500 interviews. Overall, the findings indicate that residents are aware of flood hazards and are taking actions to protect their property from flood damage. Furthermore, results show that residents in CRS communities are more educated about these hazards and are therefore taking more proactive measures. Residents from CRS communities are more aware than residents from non-CRS communities that their home is located in a SFHA. Still, a large percentage of CRS residents indicated that they did not know whether their homes were in a SFHA.

FEMA. (1997). ***Building Performance Assessment: Hurricane Fran in North Carolina – Observations, Recommendations, and Technical Guidance*****. Washington, DC, and Atlanta, GA: FEMA and FEMA Region IV.**
Keywords:
Hurricane Fran, North Carolina, building codes, mitigation
Abstract: This report presents the observations of FEMA's Building Performance Assessment Team (BPAT) regarding the success and failures of buildings that experienced wind and flood effects of Hurricane Fran in North Carolina in 1996. During its evaluation BPAT found that on old and new oceanfront homes many porches, decks, and roof overhangs supported on vertical foundation members collapsed or became structurally unsound. The vast majority of vertical foundation members were found to have been embedded only 4 to 5 feet below existing grade without any regard for erosion or scour. Furthermore, the concrete slabs observed did not have a sufficient number of contraction joints to promote the slab's breaking into small pieces. Based on its findings and conclusions, BPAT makes several recommendations including, but not limited to, the embedment of pilings for structures in areas subject to erosion and the presence of a sufficient number of contraction joints between pilings and in both directions on the surface of a concrete slab.

FEMA. (1997). ***Federal Insurance Administration: 1997 Stakeholder's Report*****. Washington, DC: FEMA.**
Keywords:
NFIP
Abstract: This report provides an annual update on the status of the NFIP, detailing activities on policies, claims, and marketing. As of fiscal year 1997, the NFIP included 3,811,253 policies –

an increase of 7.5 percent from the previous year – protecting $422.4 billion in flood insurance. Premiums for NFIP policies in force grew by 15 percent in fiscal year 1997. Several severe flooding events resulted in total claims payments of over $630 million. Between 1995 and 1997 the NFIP made claims payments of more than $2.8 billion. FEMA initiated several new programs in 1997. First, Increased Cost of Compliance (ICC) coverage offers funding to homeowners to help cover the costs of bringing homes and businesses into compliance with community floodplain ordinances. To explain the new coverage, the NFIP offered 12 training workshops nationally, attended by more than 800 people, and published several brochures describing coverage availability. FEMA's Project Impact, an initiative designed to foster pre-disaster mitigation for all hazards, is also described.

FEMA. (1997). ***Flood Insurance Availability in Coastal Areas: The Role It Plays in Encouraging Development Decisions.*** **Washington, DC: FEMA.**

Keywords:
Delaware, coastal areas, development, Coastal Barrier Resources System, coastal barriers, insurance purchase decision, risk perception, insurance coverage

Abstract: Over the last two decades, a question has arisen as to what role, if any, the availability of flood insurance has played in a local community's decision to develop or not develop coastal, beachfront areas. One opinion is that the availability of flood insurance in these areas is either the deciding factor or at least a major factor that influences that decision. Another opinion is that the decision to develop or not develop is the result of the economic forces affecting the area in question at the time of the decision. This report uses the community of North Bethany Beach, DE, in an attempt to study this question. Interviews with local government officials, developers, realtors, insurers, and mortgage lenders show that the most important factors in promoting development at North Bethany Beach are proximity to major metropolitan areas, the supply and demand of oceanfront property, lifestyle, exclusivity, and the overall national economy. For high-end coastal property, such as North Bethany Beach, it appears that federal flood insurance plays a secondary or even tertiary role in coastal development. This report notes the importance of conducting similar studies in other coastal areas where real estate is considerably less expensive.

FEMA. (1997). ***Flood Mitigation Assistance Guidance*****. Washington, DC: FEMA.**

Keywords:
Flood Mitigation Assistance Program, mitigation, federal programs, flood disaster planning

Abstract: Under the Flood Mitigation Assistance (FMA) Program, FEMA provides assistance to states and communities for activities that will reduce the risk of flood damages to structures insurable under the NFIP. FMA is a state-administered, cost-share program through which states and communities can receive grants for planning, technical assistance, and projects related to flood mitigation. The three goals of the program are (1) to reduce the number of repetitively or substantially damaged structures and the associated claims on the National Flood Insurance Fund; to encourage long-term, comprehensive mitigation planning; (2) to respond to the needs of communities participating in the NFIP by expanding their mitigation activities beyond the review of floodplain development and permitting; (3) and to complement other federal and state mitigation programs with similar, long-term goals. The chapters in this guidance provide an overview of FMA; the federal, state, and local roles in administering the program; planning

grants; project grants; technical assistance grants, requirements for cost-sharing and limitations on funding; and management of grants.

FEMA. (1997). ***Guidance on Estimating Substantial Damage Using the NFIP Residential Substantial Damage Estimator*****. Washington, DC: FEMA.**
Keywords:
substantial damage, mitigation, building codes
Abstract: Communities that participate in the NFIP often have difficulty determining whether structures meet the program's definition of being substantially damaged. This is particularly true after a major flood or other disaster in which large numbers of buildings have suffered damage and there is a need to provide damage determinations so that reconstruction can begin. Substantially damaged structures in SFHAs must be brought into compliance with the minimum requirements of a community's floodplain management ordinance and the NFIP. To assist communities in making determinations of substantial damage, FEMA developed the Residential Substantial Damage Estimator (RSDE) software, which provides guidance in estimating building value and damage costs for both single family and manufactured homes. Based on the NFIP's regulatory requirements, the software is intended to be used in conjunction with industry-accepted, residential-cost estimating guides. This document provides information on how to use the software as well as how to collect data and conduct field inspections. FEMA updated the guidance in August 2001.

FEMA. (1997). ***Modernizing FEMA's Flood Hazard Mapping Program: A Progress Report*****. Washington, DC: FEMA.**
Keywords:
mapping, agency operations and management, strategic planning
Abstract: This report represents the initial product of a task force convened to plan the future of FEMA's Flood Hazard Mapping Program. It surveys the current state of the program, presents a visionary plan for the future, and details the strategies for implementing the plan. The cornerstones of the modernization plan are: (a) to develop accurate and complete flood hazard information for the entire nation; (b) to provide that information in a readily available, easy-to-use format; and (c) to alert and educate the public regarding the risks of flood hazards. The plan will use existing digital engineering, mapping, information management, and electronic communication technologies to improve the program in four primary areas: map accuracy and completeness; map utility; map production; and public awareness and customer service. A cost-benefit analysis is currently being conducted to determine if the benefits to the nation resulting from the plan will exceed the costs.

FEMA. (1997). ***Multihazard Identification and Risk Assessment*****. Washington, DC: FEMA.**
Keywords:
hazard identification, risk assessment
Abstract: This document summarizes the findings of a research project to clarify and document previous efforts to identify natural and technological hazards and to assess associated risks. The report is one part of an effort to develop a national approach to mitigating human and economic losses caused by disasters. The chapter on floods includes sections on hazard identification; risk assessment; research, data collection, and monitoring activities; and mitigation approaches. Among others, the report concludes that the large influx of people to coastal areas over the past

30 years resulted in thousands of residents who are unaware of the hazard associated with hurricanes and floods in coastal high-hazard zones. Also, the report claims that in the immediate shorefront area affected by tropical cyclones, relocation of exposed utility lines, water mains, sewer lines, and roadways has been effective in mitigating damage. The report warns that land-use controls and regulatory setback programs in coastal high hazard zones can be difficult because of intense development pressure and high property values. The report states that the NFIP has probably been the most dominant positive influence on floodplain management over the past 15 years. However, the majority of buildings exposed to identified flood hazards remains uninsured.

FEMA. (1997). ***National Flood Insurance Program: Interim Guidance for Local and State Officials – Increased Cost of Compliance Coverage*****. Washington, DC: FEMA.**
Keywords:
insurance, insurance coverage, substantial damage, mitigation, buyouts, relocation, floodproofing
Abstract: This guidance document provides information on the Increased Cost of Compliance (ICC) coverage under the NFIP and how it relates to local administration of floodplain management laws or ordinances following a flood event. Specifically, the guidance discusses how insured buildings under the NFIP that are damaged by flooding will benefit from this coverage, how ICC coverage relates to local administration of floodplain management laws or ordinances, what types of mitigation measures are allowed under ICC, and what types of technical assistance are available for state and local officials. ICC coverage provides for the payment of a claim to help pay for the cost to comply with state or community floodplain management laws or ordinances after a flood event in which a building has been declared substantially or repetitively damaged. When a flood damages an insured building and the state or community declares the building to be substantially or repetitively damaged, ICC will help pay for the cost to elevated, floodproof, demolish, or relocate the building up to a maximum benefit of $15,000 ($30,000 as of May 1, 2003). This coverage is in addition to the building coverage for the repair of actual physical damages from the flood under the Standard Flood Insurance Policy (SFIP).

FEMA. (1997). ***Partnership for a Safer Future: Strategic Plan FY 1998 through FY 2007 with Operational Objectives through FY 2003.*** **Washington, DC: FEMA.**
Available at: http://www.fema.gov/library/splan.pdf.
Keywords:
strategic planning, agency operations and management
Abstract: This update of FEMA's 1994 strategic plan complies with the requirements of the Government Performance and Results Act. The plan describes FEMA's role as leader for the Nation's emergency management system and its specific responsibilities, mission, vision, eight core values, and strategic planning template. The plan then identifies the agency's three strategic goals: (a) protect lives and prevent the loss of property from all hazards; (b) reduce human suffering and enhance the recovery of communities after disaster strikes; and (c) ensure that the public is served in a timely and efficient manner. For each goal, strategic objectives are identified, including performance measures, strategies to achieve each goal, five-year operational objectives, the legal authorities to support the strategy, the technology to implement the strategy, and the methods to evaluate performance.

FEMA. (1998). ***Annual Performance Plan: Fiscal Year 1999*****. Washington, DC: FEMA.**
Keywords:
strategic planning, agency operations and management
Abstract: This plan outlines how FEMA's strategic goals and objectives will be pursued during FY 1999. The annual performance goals presented in the plan support a five-year operational objective contributing to one of three strategic goals: to protect lives and prevent the loss of property from natural and technological hazards, to reduce human suffering and enhance the recovery of communities after disaster strikes, and to ensure the public is served in a timely and efficient manner. Some of the objectives within these goals include a reduction in expected annual flood disaster losses by $1 billion and the identification of the most critical 10-percent of weaknesses in state capability while maintaining the current capability of states and localities to respond to disasters. Other objectives seek to achieve training and education opportunities for the fire protection community and to use information technology upgrades to improve services and accessibility that reduce the costs for the response to and recovery from emergencies and disasters.

FEMA. (1998). ***An Evaluation of the National Flood Insurance Program's Community Rating System*****. Washington, DC: FEMA.**
Keywords:
Community Rating System, mitigation
Abstract: In 1994, a formal evaluation of the overall effectiveness of the Community Rating System (CRS) was initiated. Due to the technical and statistical nature of these evaluation analyses and the need for impartial expertise, FEMA retained Human Technology, Inc. to assist in this endeavor. The data collection and analytical techniques included questionnaires and surveys, technical studies, site visits, focus groups, and reviews by experts. As a result of the evaluation efforts, three general conclusions were reached with regard to changes in the CRS creditable activities: (a) certain elements deserve more credit based on a review of their effectiveness in reducing flood losses; (b) communities should be encouraged to design their own programs; and (c) scoring procedures and documentation requirements should be simplified. Overall, CRS has become an important tool for mitigation as well as a mechanism for integrating mitigation with insurance.

FEMA. (1998). ***Community Rating System Survey*****. Washington, DC: FEMA.**
Keywords:
Community Rating System
Abstract: Four years after the implementation of the Community Rating System (CRS) in 1990, FEMA's Community Rating System Task Force formed an Evaluation Committee to determine whether CRS is meeting its original expectations. If it is not, adjustments to the program, including training and nontraining interventions, may be necessary to ensure that the long-term goals will be achieved. The Local Official Survey was designed to determine CRS local officials' opinions about the effectiveness of the CRS program and the usefulness of specific flood protection activities for which FEMA awards credit. This report provides the data collected from the Local Official Survey and is divided into the following components: overall responses, demographics, and statistical analysis. A total of 897 CRS Coordinators were sent surveys. This number represents every community participating in the CRS program from 1990 to 1994. Of the 897 surveys, a total of 661 surveys were returned (return rate of 73.69%). Overall, findings from

the survey indicate respondents hold positive opinions toward the program and its benefits; feel the program educates and protects the public; believe that the benefits of program may not outweigh the administrative costs, time, and effort required; and support a simple system for crediting program activities. Based on survey comments, two activities that warrant additional consideration by the Evaluation Committee are outreach and repetitive loss projects.

FEMA. (1998). ***Federal Insurance Administration: 1998 Stakeholder's Report*****. Washington, DC: FEMA.**
Keywords:
NFIP
Abstract: This report provides an annual update on the status of the NFIP and includes discussion of program growth, claims and flooding statistics, changes to the program, studies undertaken by FEMA, marketing and training, and future initiatives. At the close of fiscal year 1998, the NFIP had more than 4.1 million flood insurance policies in effect. In 1998, the NFIP paid claims losses of over $670 million. The report also discussed the implementation of Project Impact, a multihazard mitigation program. Nearly 120 communities and 800 companies were involved with Project Impact, initiated in 1997.

FEMA. (1998). ***Hazard Mitigation Funding under Section 406 (Stafford Act)*****. Washington, DC: FEMA.**
Keywords:
mitigation, Stafford Act, Hazard Mitigation Grant Program
Abstract: This document is intended to guide personnel responsible for the administration of FEMA's public assistance grant program. Its aim is to help ensure national consistency in the use of Section 406 mitigation funds, promote measures that reduce future loss to life and property, protect the federal investment in public infrastructure, and, ultimately, to help build disaster-resistant communities. An appendix lists potential mitigation measures that can be considered cost effective. FEMA considers a mitigation measure to be cost-effective when the measure: (a) does not exceed 100 percent of the project's cost; (b) is appropriate to the disaster damage; (c) will prevent future similar damage; (d) is directly related to the eligible damaged elements; (e) does not increase risks or cause adverse effects to the property or elsewhere; (f) meets standards of good professional judgment; and (g) otherwise meets requirements stipulated in the policy on hazard mitigation funding under Section 406 of the Stafford Act.

FEMA. (1998). ***NFIP: Working Paper on Repetitive Loss Buildings*****. Washington, DC: FEMA.**
Keywords:
repetitive losses, mitigation, pre-FIRM structures, property values, enforcement, insurance coverage, compliance
Abstract: This paper characterizes the NFIP's repetitive loss problem and discusses what FEMA has done to address the issue. A repetitive loss building is defined in this paper as one that has had at least two losses over $1,000 in any 10-year period since 1978. As of March 31, 1997, there were cumulatively 208,174 losses totaling $2.8 billion paid on 76,284 repetitive loss properties. Repetitive losses account for 32.4 percent of the number of losses incurred since 1978 and 37.8 percent of all dollars paid. The $2.8 billion in losses includes $2 billion in building losses and $800 million in contents losses. In addition to detailed statistics and extensive

discussion on repetitive loss properties, the paper also reviews initiatives undertaken by FEMA to address the problem. For example, FEMA has developed a series of manuals and courses aimed at providing information to design professionals and homeowners on retrofitting. The establishment of the Flood Mitigation Assistance (FMA) Program in 1994 secured funds to reduce losses to repetitive loss and substantially damaged properties. Finally, FEMA requires communities participating in the Community Rating System (CRS) and having 10 or more repetitive loss buildings to develop a repetitive loss plan as a condition of participation.

FEMA. (1998). ***Proceedings in Preparation for the July 30, 1997, Report to the Honorable James L. Witt, Director, Federal Emergency Management Agency*****. Washington, DC: FEMA.**
Keywords:
mapping, strategic planning, agency operations and management
Abstract: This document compiles the reports from groups working to modernize FEMA's Flood Hazard Mapping Program. The findings of the work groups became a report presented in 1997 to FEMA's director. The report surveys the current challenges facing the NFIP's mapping program and presents a plan for an efficient transition to the electronic age. The document also includes a cost analysis and time frames for enacting the plan at various levels of funding. The Hazard Identification and Risk Assessment Division recommended the plan as the best means of addressing current challenges and enhancing the role of flood hazard maps as a valuable national resource for flood hazard mitigation and relief. A version of this report—*Modernizing FEMA's Flood Hazard Mapping Program, A Progress Report*—was issued to constituents of the flood mapping program in November 1997. As a result of this plan, state and local officials, private property owners, and others will be made more aware of flood hazards nationwide. This awareness, it is hoped, will be realized through an increase in the sale of flood insurance policies and through the construction of safer communities. Thus, the plan will reduce the burden on the general taxpayer for disaster relief and maintain the maps as a valuable resource for mitigating flood hazards. The cornerstones of the plan are to use state-of-the-art technology to develop accurate and complete flood hazard information for the entire nation; to provide that information in a readily available, straightforward format; and to alert and educate that public regarding the risks of flood hazards.

FEMA. (1998). ***Review of FEMA's Implementation of Insurance Requirements in the Public Assistance Program*****. Washington, DC: Office of Inspector General, FEMA.**
Keywords:
mandatory purchase, public assistance
Abstract: This review determines whether FEMA could improve its administration of the insurance coverage mandate in the Public Assistance Program. The review identified the following opportunities to streamline the application, review, and approval process for such assistance: (a) recruit a cadre of insurance specialists; (b) require all pertinent insurance information at the time of application for assistance; and (c) consider anticipated insurance proceeds in determining eligibility for funding at the beginning of the process. The review also recommends that FEMA clarify its rules governing waivers of requirements for insurance granted by state insurance commissioners.

FEMA. (1999). ***Audit of the Effectiveness of the Substantial Damage Rule*****. Washington, DC: Office of Inspector General, FEMA.**

Keywords:
substantial damage, substantial improvement, mitigation, insurance premiums, insurance coverage
Abstract: This audit examines how well the substantial damage rule is working as a mitigation tool and how it can be strengthened to work more effectively in the future. The OIG concludes that the substantial damage rule could prove a more effective mitigation tool if communities in the NFIP did a better job of identifying potentially substantially damaged structures. For example, communities declared only 106 structures as substantially damaged from a sample of 603 structures identified as substantially damaged using insurance claims data. As a result, mitigation efforts did not occur, which contributes to the problem of repetitive losses. Thirty-two percent of the structures included in the OIG's sample had repetitive losses totaling $19 million. Furthermore, a test of 43 structures declared substantially damaged by communities revealed that only 11 received a reclassification of post-FIRM and an actuarial re-rating. Based on its findings, the OIG recommends FEMA should (1) implement processes to ensure communities, FEMA officials, and policyholders promptly receive insurance claims information that will assist them in identifying potentially substantially damaged structures; (2) require communities to use the most objective sources to estimate costs when calculating substantial damage; and (3) consistently manage and monitor community enforcement of the substantial damage rule.

FEMA. (1999). ***Building Performance Assessment Report: Hurricane Georges in the Gulf Coast – Observations, Recommendations, and Technical Guidance*****. Washington, DC, and Atlanta, GA: FEMA and FEMA Region IV.**
Keywords:
Hurricane Georges, Alabama, Florida, Mississippi, building codes, mitigation
Abstract: This report presents FEMA's Building Performance Assessment Team's (BPAT) observations on the success and failure of buildings in the Florida Keys and Gulf Coast to withstand the wind and flood forces generated by Hurricane Georges in 1998. During its evaluation BPAT found that engineered structures constructed in accordance with current building codes, such as the Standard Building Code (SBC), requirements adopted at the local level to participate in the NFIP, and additional state and local standards performed well. Furthermore, publicly financed flood mitigation programs and planning activities clearly had a positive impact on the communities where they were implemented. Based on its findings and conclusions, BPAT makes several recommendations including, but not limited to, the adoption of a freeboard requirement (i.e., elevating a structure above BFE) by local communities and the continued development and maintenance of hazard mitigation plans at the state and local levels.

FEMA. (1999). ***Cooperating Technical Community (CTC) Guidance Document FY 2000-2001*****. Washington, DC: FEMA.**
Keywords:
floodplain management, mapping, agency operations and management, strategic planning
Abstract: FEMA has an ongoing program to update flood maps for flood-prone communities because flood conditions change over time due to natural and man-made changes in watersheds and floodplains. At the same time, however, the need for updated flood maps is increasing and federal funding is limited. As a result, a significant portion of the 100,000-panel flood map inventory is outdated. In 1997 FEMA designed a plan to modernize the inventory. Over time, the objective is to eliminate the existing backlog of outdated maps and to convert all the maps to a

digital format. One of the key objectives of the modernization plan is to increase local involvement in, and ownership of, the mapping process. Therefore, the Cooperating Technical Community (CTC) concept was developed. As technologies have increased dramatically, many states, regional agencies, and local communities have become increasingly sophisticated and have invested significant resources in the identification of flood hazards. This document contains the initial guidance for the CTC initiative. Some of the objectives of the CTC initiative are: (a) to recognize the timely and accurate flood hazard information provided by CTC partners to FEMA, (b) to integrate contributing partners into the mapping process, and (c) to provide training and technical assistance. To implement these objectives, CTC partners need to enter into an overall partnership agreement with the appropriate FEMA Regional Mitigation Division. As the CTC partner and FEMA identify specific tasks to undertake, agreements will be developed and entered into under the umbrella of the overall CTC Partnership Agreement.

FEMA. (1999). ***Cover America: FIA's Marketing and Advertising Campaign*****. Washington, DC: FEMA.**
Available at: http://www.fema.gov/nfip/market2.htm#1.
Keywords:
marketing, risk communication, Cover America, Write Your Own Program, NFIP
Abstract: In October 1995, FIA started a national marketing and advertising campaign called Cover America. The campaign's goals include improving awareness of and attitudes toward the NFIP and flood insurance, stimulating demand for flood insurance, and providing opportunities for insurance agents, Write Your Own (WYO) companies, and other NFIP stakeholders to participate in and build on the messages delivered. The Cover America campaign uses paid advertising and public relations to reach consumers, insurance agents, and other NFIP stakeholders. Market research is conducted throughout the year to assess how well the campaign is meeting its goals. Findings from this research and other tracking mechanisms are used to improve the campaign. This document describes the campaign and its different components: television, print and radio advertising, direct mail, and Yellow Pages. This document also describes the NFIP cooperative advertising program, which provides WYO companies and insurance agents the opportunity to split their advertising costs for any approved flood insurance print or Yellow Pages display ads with the NFIP as well as the development of public relations and of collateral materials such as brochures. This document also provides some results attributable to the Cover America campaign. Those results are in concordance to those produced for FEMA by Gallup and Robinson, Inc. (1999).

FEMA. (1999). ***Environmental Policy Memoranda*****. Washington, DC: FEMA.**
Keywords:
environmental policy, public assistance, federal programs
Abstract: This document compiles all environmental policy memoranda that have been issued by FEMA and in effect as of May 1999. The document should serve as an easy reference for program staff coordinating public assistance grant activities involving environmental issues. Five environmental memoranda are included: (a) Categorical Exclusion (CATEX) of Projects Involving the Acquisition of Damaged Properties and Implementation of E.O. 12898 Concerning Environmental Justice, April 18, 1994; (b) Other Federal Agency Clearance for Environmental Assessments, May 24, 1994; (c) Policy for Projects Completed Without Environmental Review Required by the National Environmental Policy Act (NEPA), March 24, 1995; (d) Availability

and Use of the Updated List of Categorical Exclusions Published February 5, 1996, as a Revision of 44 CFR 10.8, February 27, 1996; and (e) Documentation of the National Environmental Policy Act (NEPA) Categorical Exclusions (CATEX), June 20, 1997.

FEMA. (1999). ***Federal Insurance Administration: 1999 Stakeholder's Report*****. Washington, DC: FEMA.**
Keywords:
NFIP
Abstract: This report provides an annual update on the status of the NFIP. It details activities on policies, claims, marketing, communication, and training. As of fiscal year 1999, the NFIP had 4,187,729 policies in 19,023 communities. Hurricanes Frances, Georges, and Floyd represented some of the major flood disasters of the year. Payments on insurance claims from Hurricane Floyd alone totaled nearly $398 million. Several important initiatives occurred in 1999. The number of communities participating in Project Impact reached 185, with more than 1,000 business partners. Legislation was introduced in Congress to reduce the burden of repetitive flood losses. FEMA developed a Map Modernization Plan to update and digitize flood insurance rate maps. In order to finance the cost of mapping, FEMA developed the Cooperating Technical Community (CTC) Program, in which FEMA establishes formal agreements with communities, regional agencies, and states to conduct mapping in a particular area.

FEMA. (1999). ***Guidelines and Specifications for Flood Map Production Coordination Contractors*****. Washington, DC: FEMA.**
Keywords:
mapping, floodplain management, Special Flood Hazard Areas, flood insurance studies
Abstract: These guidelines define the technical requirements, coordination and documentation activities, and product specifications for a variety of technical tasks such as reviewing the results of studies completed by FEMA's study contractors; converting nonflood-prone and minimally flood-prone communities to the regular phase of the NFIP; processing requests for revisions to flood insurance studies and FIRMs; identifying letters of map change that are superseded when a revised FIRM becomes effective; processing community requests for map updates to reflect recent annexations; processing requests for FEMA's review of determinations made by lending institutions whether buildings or manufactured homes are located in identified SFHAs; responding to inquiries from FEMA's constituents about the NFIP; responding in writing to inquiries from Congress about mapping-related matters; processing map revisions under the Coastal Barrier legislation; performing riverine and coastal erosion studies; providing risk assessment activities; and others.

FEMA. (1999). ***Hazard Mitigation at Work: Two Alabama Communities*****. Washington, DC: FEMA.**
Keywords:
Alabama, cost-benefit analysis, mitigation, buyouts, Hazard Mitigation Grant Program
Abstract: This report tells the story of how the cities of Elba and Geneva, AL, with help from FEMA, reduced the impact of repeated flooding. The report begins with a discussion of the Hazard Mitigation Grant Program (HMGP) and provides an overview of the benefit-cost analysis used by FEMA to evaluate mitigation projects. An explanation of the hazard mitigation projects implemented in each community follows. FEMA funded the installation of a stormwater

drainage system in Elba and the removal of flood-prone properties in Geneva. Both communities realized the benefits of mitigation when flooding occurred only a few years after the projects' implementation. Results from the projects underscore the success of mitigation in hazard-prone communities.

FEMA. (1999). ***Hazard Mitigation at Work: Two Georgia Communities*****. Washington, DC: FEMA.**
Keywords:
Georgia, cost-benefit analysis, mitigation, buyouts, Hazard Mitigation Grant Program
Abstract: This report tells the story of how the cities of Newton and Albany, GA, with help from FEMA, reduced the impact of repeated flooding. The report begins with a discussion of the Hazard Mitigation Grant Program (HMGP) and provides an overview of the benefit-cost analysis used by FEMA to evaluate mitigation projects. An explanation of the hazard mitigation project implemented in each community follows. FEMA funded the removal of hundreds of flood-prone properties in both Newton and Albany. Both communities realized the benefits of mitigation when flooding occurred only a few years after the removal of the properties. Results from the project underscore the success of mitigation in hazard-prone communities.

FEMA. (1999). ***Hazard Mitigation Grant Program Desk Reference*****. Washington, DC: FEMA.**
Keywords:
Hazard Mitigation Grant Program, Stafford Act, mitigation, legislation
Abstract: Authorized under Section 404 of the Stafford Act, FEMA's Hazard Mitigation Grant Program (HMGP) provides grants to state and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The program aims to reduce the loss of life and property due to natural disasters and to enable the implementation of mitigation measures during the immediate recovery from a disaster. FEMA can fund up to 75 percent of the eligible costs of each project. Eligible applicants include state and local governments, Native American tribes, and certain nonprofit organizations. Although homeowners and businesses cannot apply directly to the program, a community can apply on their behalf.

FEMA. (1999). ***Managing Development Through the National Flood Insurance Program*****. Washington, DC: FEMA.**
Keywords:
NFIP, mapping, floodplain management, compliance, enforcement, substantial damage, substantial improvement, variances, insurance, Community Rating System, Coastal Barrier Resources System, mitigation, disaster assistance, training
Abstract: All levels of government—local, state, and federal—and the private sector share responsibility for flood loss reduction. Fulfilling this responsibility depends on having the knowledge and skills to plan and implement needed floodplain management measures. The fundamental floodplain management program that others are built on is the NFIP. The purpose of this home study course is to enhance the knowledge and skills of local officials responsible for administering and enforcing local floodplain management regulations. It is also intended to broaden the understanding of floodplain management strategies that can be applied at the local level. The course is for the local official responsible for administering the community's floodplain management program. Primary instructional material for the course includes ten units on topics related to the NFIP and seven appendices.

FEMA. (1999). ***Mandatory Purchase of Flood Insurance Guidelines*****. Washington, DC: FEMA.**
Keywords:
legislation, mandatory purchase, lending institutions
Abstract: Title V of the Riegle Community Development and Regulatory Improvement Act of 1994 (the Reform Act) substantially amended the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The Reform Act tightened the mandatory purchase provisions that originated with the Flood Disaster Protection Act of 1973. As the result of the Reforms Act's continuing impact upon lenders, FIA updated and reformatted the guidelines for mandatory purchase, previously issued in October 1989 and May 1997. These guidelines present an overview of the Reform Act as it amended the 1973 Act. They explain the applicable statutes or regulations. Several appendices contain the relevant statutes and regulations addressed in the guidelines as well as specific supplementary information referenced in the document. The guidelines also include process flowcharts, a glossary, and an index.

FEMA. (1999). ***Mapping Activity Statement Templates for Cooperative Technical Partners Initiative*****. Washington, DC: FEMA.**
Keywords:
mapping
Abstract: The Mapping Activity Statements cover a range of products and services that depend on the partner's interest, technical expertise, and available resources. The statements can cover simple activities, such as providing a digital base map, and more sophisticated activities, such as conducting flood hazard studies and preparing print-ready digital flood maps for distribution by FEMA. Nine templates for Mapping Activity Statements are included. These templates address the most common mapping activities and can be used directly or as guidelines for the development of specific agreements between FEMA and its local, regional, or state partners. According to FEMA, agreements other than the nine listed may also be possible.

FEMA. (1999). ***Model Programmatic Agreement: Historic Review*****. Washington, DC: FEMA.**
Keywords:
historic sites, public assistance, legislation
Abstract: This document makes available the Model Programmatic Agreement to accomplish the requirements of Section 106 under the National Historic Preservation Act (NHPA) of 1966, as amended. It is intended for FEMA personnel who coordinate historic review for the agency's undertakings using public assistance grants. Section 106 of NHPA requires all federal agencies to review the effect of an agency undertaking on historic properties prior to funding the project, activity, or program. FEMA developed this document to simplify and expedite coordination and to provide specific guidance to consulting parties in the historic review process. This document also exempts routine disaster-recovery activities with little potential of adversely affecting historic properties from the review mandated by NHPA.

FEMA. (1999). ***Modernizing FEMA's Flood Hazard Mapping Program: Recommendations for Using Future Conditions Hydrology for the National Flood Insurance Program*****. Washington, DC: FEMA.**
Keywords:

mapping, hydrology and hydraulics
Abstract: This document describes FEMA's plan to modernize its mapping program through cooperative agreements with state and/or local partners. FEMA will provide funds for mapping, technical assistance, and mentoring to the state or local partner, which will then develop and maintain all or a component of its flood map, thus maintaining the connection between mapping and managing flood hazard areas. One conclusion is that FEMA's maps should display floodplains based on future conditions hydrology, as determined by the local partners, while FEMA will continue to require regulation of floodplain development based on existing conditions data. Topics discussed include the role of state and local partners; emphasis on local mapping needs; historical perspective on future conditions; defining future conditions; use of flood hazard maps for floodplain management, flood insurance rating, and other purposes; constraints and benefits of using future conditions data on NFIP maps; conclusions; and implementation through map specifications, Cooperating Technical Community agreements, revisions, rule making, and outreach.

FEMA. (1999). ***Modernizing FEMA's Flood Hazard Mapping Program: Fiscal Year 1999 Progress Report*****. Washington, DC: FEMA.**
Keywords:
mapping, agency operations and management, strategic planning
Abstract: FEMA developed a plan in 1997 to modernize its program of mapping flood hazards. This report summarizes the progress made toward implementing the plan in FY 1999. The plan is a seven-year effort to upgrade FEMA's inventory of flood maps and enhance its products, services, and processes. It is anticipated that the map modernization plan will help prevent approximately $26 billion in flood damages to new buildings over a 50-year period. The major components of the process include an assessment of mapping needs, a tailored scope of work to be developed with FEMA's mapping partners, and concurrent production processes. Based on accomplishments to date and current map modernization priorities, FEMA has updated the list of map modernization objectives. Some objectives identified on the original list are now fully developed, ongoing components of the flood mapping program and thus, have been removed from the list (e.g., FEMA Map Assistance Call Center). Others are no longer considered as map modernization objectives but rather, are continuing under normal operations of FEMA's flood mapping programs. Finally, new objectives have been identified and initiated in the report.

FEMA. (1999). ***Mutual Aid Agreement for Public Assistance*****. Washington, DC: FEMA.**
Keywords:
public assistance, Stafford Act
Abstract: This document specifies criteria by which FEMA will recognize the eligibility of costs under the Public Assistance Program incurred through mutual aid agreements between applicants and other entities. It is intended for personnel involved in the administration of the Public Assistance Program and applies to emergency work authorized under Sections 403, 407, and 502 of the Stafford Act. The motivation for this document is as follows: many state and local governments and private nonprofit organizations formulate mutual aid agreements to provide emergency assistance to each other in the event of disasters or other crises. The conditions of the agreements may be to provide reciprocal services or to receive direct payment through specific labor and equipment rates outlined in the agreements. These agreements usually are written but, occasionally, are by understanding or are arranged after a disaster occurs. The document

addresses both written and unwritten mutual aid agreements. Among others, the document lists the conditions under which FEMA will reimburse the cost of mutual aid agreement associated with emergency assistance. For example, FEMA will not reimburse applicants who do not advertise and award competitive bid contracts for permanent repairs. Moreover, FEMA recognizes only mutual aid agreements between governments or private, nonprofit organizations in separate areas and does not recognize mutual aid agreements between agencies, departments or entities of the same town, county, or state government.

FEMA. (1999). ***The National Flood Insurance Program Community Status Book*****. Washington, DC: FEMA.**
Keywords:
lending institutions, mandatory purchase, risk communication, NFIP
Abstract: This book provides information about communities participating in the NFIP as well as communities not participating in the program but that have special flood hazards identified by FEMA. The purpose of the book is to assist federally regulated lenders in determining whether flood insurance must be required as a condition of receiving a mortgage, to assist property owners and insurance agents in determining whether flood insurance is available in a particular community, and to determine the availability of a FIRM for a particular community. The book also contains several useful appendices on topics including mandatory purchase and regulations for lenders, the Mortgage Portfolio Protection Program (MPPP), guidelines and requirements for the Write Your Own (WYO) Program, and criteria for private flood insurance. FEMA updates the Community Status Book on a monthly basis.

FEMA. (1999). ***Numerical Models Accepted by FEMA for NFIP Usage*****. Washington, DC: FEMA.**
Keywords:
modeling, mapping, hydrology and hydraulics
Abstract: FEMA has developed a comprehensive listing of all numerical models acceptable for NFIP usage. This document is arranged under a chart format that provides essential references for coastal models (coastal storm surge, coastal wave height, and coastal wave effects models), hydrologic models (single event and continuous event models), statistical models, hydraulic models (one-dimensional steady flow, one-dimensional unsteady flow, two-dimensional steady/unsteady flow, and floodway analysis models), and sediment transport models.

FEMA. (1999). ***Partnership for a Safer Future: Annual Performance Report 1999.*** **Washington, DC: FEMA.**
Keywords:
strategic planning, agency operations and management
Abstract: In FY 1997, FEMA developed its strategic plan, *Partnership for the Future,* and the FY 1999 Annual Performance Plan (APP) on which this report is based. These first planning efforts under the Government Performance and Results Act reflect FEMA's commitment to produce comprehensive planning documents in support of effective and efficient government and are very ambitious. While each of the 66 APP activities leads toward the achievement of FEMA's strategic goals, the agency believes that the detail and continuing measure of some of the activities is more meaningful at the program levels than it is at the strategic levels. For this reason, during FY 1999, FEMA revised its strategic objectives to tighten the focus of its annual

goals toward more measurable outcomes consistent with the agency's mission. This report is divided into two sections. The first section highlights FY 1999 activities, goals and measures that demonstrate the breadth of FEMA's efforts and achievement toward its strategic goals. The second section is a comprehensive report of FY 1999.

FEMA (1999). ***Public Assistance Guide*****. Washington, DC: FEMA.**
Keywords:
public assistance
Abstract: FEMA's Public Assistance (PA) Program provides grants to support the recovery of public infrastructure. Potential recipients of this funding include state and local governments and certain types of private, nonprofit organizations. This guide describes the program's provisions and application procedures and replaces the guide issued in September 1996.

FEMA. (1999). ***Riverine Erosion Hazard Areas: Mapping Feasibility Study*****. Washington, DC: FEMA.**
Keywords:
erosion, mapping, modeling, riverine areas
Abstract: Section 577 of the National Flood Insurance Reform Act of 1994 requires that FEMA submit a report to Congress that evaluates the technological feasibility of mapping Riverine Erosion Hazard Areas (REHAs) and assesses the economic impact of erosion and erosion mapping on the NFIP. This study determines whether it is technologically feasible to map riverine erosion hazards. Based on a literature review, an analysis of case studies, and input from experts, methodologies for analyzing and mapping REHAs were identified. Using cost data associated with existing case studies, FEMA estimated the approximate cost per river mile of conducting riverine erosion hazard studies and adding areas to existing FIRMs. The case studies indicated that there are scientifically sound procedures for delineating riverine erosion hazards, although for shorter time frames (30 years) than the 60 years specified in Section 577. Estimated average study values are $2,000-$3,000 per mile for geomorphic methods, $6,000-$7,000 per mile for engineering methods, and $10,000-$12,000 per mile for mathematical modeling methods. The report estimates that the implementation of this effort as part of the NFIP would cost between $200 and $300 million. This report does not include a cost-benefit analysis.

FEMA. (1999). ***Vermont lender compliance with the Flood Disaster Protection Act of 1973 and the Title V of the Riegle Community Development and Regulatory Improvement Act of 1994*****. (Draft). Boston, MA: FEMA Region I.**
Keywords:
lending institutions, mandatory purchase, Vermont
Abstract: This post-disaster study assesses the rate of lender compliance following catastrophic flooding in Vermont during the summer of 1998. FEMA determined that out of the 1,549 applications received for federal disaster assistance, 120 of them came from commercial or residential properties located in Special Flood Hazard Areas (SFHAs) designated as Flood Zone A. The study finds that 54 of these properties (45 percent) had mortgages from a federally regulated institution but did not have flood insurance as required by law. Moreover, the federal government provided approximately $500,000 in disaster assistance to these properties—money that would not have been provided had these properties maintained flood insurance.

FEMA. (2000). ***Annual Performance Plan: Fiscal Year 2001*****. Washington, DC: FEMA.**
Keywords:
strategic planning, NFIP, agency operations and management
Abstract: The *Annual Performance Plan* outlines how FEMA's strategic goals and objectives will be pursued during FY 2001. The plan presents 30 annual performance goals for FY 2001. Each of these supports a five-year operational objective contributing to one of the three FEMA strategic goals. Some of the objectives include an increase in the availability and effectiveness of natural hazards information and an increase in the availability of loss-estimation and risk-assessment methods and tools. Other activities include working with federal agencies that influence the built environment to develop and implement a consistent federal policy on natural-hazard mitigation; providing incentives and support to the nonfederal public sector to increase disaster resistance; increasing by 20 percent over 2000 baselines the private sector's involvement in disaster resistance; and supporting states, tribes, and communities in their mitigation activities. FEMA will also collect and validate building and flood loss data; confirm that the reduction in estimated losses from NFIP activities exceeds $1 billion; continue a systematic assessment of the NFIP's impact and effectiveness; increase the number of NFIP policies in-force by 5 percent; mitigate repetitive loss properties; and implement measures to reduce the subsidy for pre-FIRM properties to improve the program's underwriting ratio.

FEMA. (2000). ***Audit of FEMA's Cost Estimate for Implementing the Flood Map Modernization Plan*****. Washington, DC: Office of Inspector General, FEMA.**
Keywords:
mapping, agency operations and management
Abstract: This report concludes that FEMA can and should improve its estimates of the cost of the Flood Map Modernization Plan (MMP). In some instances, the agency did not verify data, use reliable cost data, or establish a sound basis for some assumptions. In addition, FEMA did not fully consider savings that could be realized from technology. The report recommends that FEMA validate its mapping needs for mapped and unmapped communities, determine the cost effectiveness of creating or updating maps, track costs related to map modernization so that actual cost data will be available to use in estimating future costs, and present the estimate as a range to better disclose the uncertainty in the assumptions and the financial impact of alternative assumptions. The OIG also recommends that the Mitigation Directorate expedite the incorporation of new flood-study and terrain data collection techniques and include in its MPP the financial impact of partnerships with state and local governments, new techniques for mapping, and technological advances.

FEMA. (2000). ***Call for Issues Status Report*****. Washington, DC: FEMA.**
Keywords:
strategic planning, NFIP
Abstract: In 1998, as part of its ongoing efforts to achieve even higher levels of effectiveness, FEMA decided to solicit input on all facets of the NFIP from partners and customers of the program. The solicitation was implemented through a nationwide Call for Issues. This report summarizes issues related to insurance coverage, public information, floodplain management, and hazard identification, among others. FEMA responds to each issue submitted with a definitive decision and/or potential action.

FEMA. (2000). *Compendium of Flood Map Changes Archive*. Washington, DC: FEMA.
Keywords:
mapping
Abstract: This compendium lists all the changes made to FIRMs including Physical Map Revisions, Letters of Map Revision, and Letters of Map Amendment during a given six-month period. For each Letter of Map Change, the listing provides the map panel(s) affected, the effective date of the change, case, number, and determination type. For each Physical Map Revision, the listing provides the map panel(s) affected and the effective date of the change. The listing is updated every six months and published in the Federal Register.

FEMA. (2000). *Cover America II*. Washington, DC: FEMA.
Available at: http://www.fema.gov/nfip/coverii.htm
Keywords:
marketing, risk communication, Cover America, NFIP
Abstract: This document describes the characteristics of the Cover America II campaign. This campaign started in 1999 and will continue until 2003. It replaces the Cover America I campaign (1995-1999). The document announces that to increase awareness, improve attitudes, and increase flood insurance sales, FEMA has "established a brand for the NFIP. It builds on the yellow diamond street sign, which we see everyday, used to warn drivers of upcoming dangers and to change their behavior as a result of the potential danger. Our new brand couples this sign with the message: 'Be Flood Alert.' To the right of the sign are the words: 'National Flood Insurance Program.' This brand aims to serve as the foundation for all components of the campaign, including advertising, co-op advertising, and public relations, and gives us the opportunity to talk about all aspects of the NFIP, from mitigation to flood insurance. This document describes the 1999 radio and TV campaign and the co-op advertising program. It also lists 'mat stories': stories written and distributed to newspapers across the country throughout the year. These articles provide tips about floods, flood insurance, and flood prevention." The document contains samples of printed ads, testimony of some co-op advertising partners, and some recent mat stories.

FEMA. (2000). *Digest and Guide on Litigation Concerning the National Flood Insurance Program*. Washington, DC: Office of the General Counsel and FIA.
Keywords:
legal issues and litigation, NFIP, legislation
Abstract: This digest summarizes the holdings of relevant cases that involve the NFIP and to which FEMA, HUD, FIA, the National Flood Insurers Association, companies participating in the WYO program, or local governments were parties. It consists of cases reported in the national (West) reporters, the Commerce Clearing House (CCH) Insurance reporters, and the electronic reporters, as well as significant unreported cases. There may be other significant unreported cases concerning WYO parties, that WYO counsel failed to bring to the attention of FEMA's Office of the General Counsel (OGC) and FIA. The cases are digested under subject categories including threshold; coverage; underwriting; notice of loss; damages; attorney fees under the Equal Access to Justice Act (EAJA); fraud; subrogation; publication and marketing of the NFIP; constitutionality, statutory purpose, and structure of the NFIP; and floodplain management and mapping. The citations are to the bound reports, including CCH Insurance reporters if not found in the West reporters, and to one or more electronic reporters if not within

the bound reporters. Parallel citations are given when it may be advantageous for the reader's access.

FEMA. (2000). ***Economic Impact Assessment Reports for Hurricane Floyd for New Jersey*****. Washington, DC: FEMA.**
Keywords:
economic impacts, Hurricane Floyd, New Jersey
Abstract: This report, completed by the Department of Commerce's Economic Development Administration at FEMA's request, is intended to: (a) provide a comprehensive assessment of the economic impacts of Hurricane Floyd on the affected areas of New Jersey; (b) provide recommendations for businesses and state and community officials on how to accelerate the recovery process; (c) implement safer, stronger, and smarter building practices; and (d) create disaster-resistant businesses and jobs. Hurricane Floyd affected more than 76,000 residences and 4,000 businesses in nine counties in New Jersey's disaster declaration. The assessment focuses on six communities that were most at risk for long-term negative impacts from the storm: the boroughs of Lodi, Bound Brook, and Manville and the cities of Trenton, Passaic, and Paterson.

FEMA. (2000). ***Economic Impact Assessment Reports for Hurricane Floyd for North Carolina*****. Washington, DC: FEMA.**
Keywords:
economic impacts, Hurricane Floyd, North Carolina
Abstract: This report, completed by the Department of Commerce's Economic Development Administration at FEMA's request, is intended to: (a) provide a comprehensive assessment of the economic impacts of Hurricane Floyd on the affected areas of North Carolina; (b) provide recommendations for businesses and state and community officials on how to accelerate the recovery process; (c) implement safer, stronger, and smarter building practices; and (d) create disaster-resistant businesses and jobs. Hurricane Floyd caused approximately $6 billion in economic losses in North Carolina: $1 billion in business structural losses, $4 billion in business revenues; and $1 billion in agricultural losses. Sixty-six of the 100 counties in the state were declared disaster areas, with 44 counties suffering economic impacts ranging from minor to severe. The assessment focuses on these 44 counties. The analysis is divided into nonagricultural and agricultural business sectors.

FEMA. (2000). ***Economic Impact Assessment of Hurricane Floyd for Virginia*****. Washington, DC: FEMA.**
Keywords:
Virginia, Hurricane Floyd, disaster assistance, disaster planning, economic impacts, agriculture, mitigation, compliance, strategic planning, insurance purchase decision
Abstract: In September 1999, Hurricane Floyd passed through southeastern Virginia causing severe inland flooding. Subsequent disaster declarations included 43 local jurisdictions. To assist the affected communities in their recovery, FEMA asked the Economic Development Administration (EDA) of the Department of Commerce to undertake a rapid assessment of the economic impacts on agriculture and businesses from Hurricane Floyd. More specifically, the primary purpose of the assessment was two-fold: to accelerate business recovery and to support the creation of sustainable business enterprises and disaster resistant jobs. EDA estimated damages of approximately $35 million to businesses and $17 million to crops in the study area

(City of Franklin and Isle of Wight and Southampton Counties). The report makes a number of recommendations for economic recovery and sustainability including, but not limited to: increasing flood risk awareness and facilitating the purchase of sufficient flood insurance, buying out and relocating vulnerable businesses from floodplains, and planning ahead for future disasters.

FEMA. (2000). ***Feasibility and Justification of Reducing Buyout Assistance to Property Owners without Flood Insurance*****. Washington, DC: FEMA.**
Keywords:
Missouri, North Carolina, buyouts, property values, public policy, insurance purchase decision
Abstract: In 1999 Congress directed FEMA to report on the feasibility and justification of reducing buyout assistance to those who failed to purchase and maintain flood insurance. To examine the policy issues FEMA (1) reviewed research and data related to the factors influencing flood insurance purchase; (2) conducted a field study to evaluate the experience of large buyout programs in Missouri and North Carolina; and (3) sought feedback from the OIG and state emergency management officials. FEMA also assessed the feasibility of implementing a policy to reduce buyout assistance to those who fail to purchase and maintain flood insurance by examining its current procedures and assessing potential implications. Overall, the research and survey work done by FEMA led to the conclusion that no justification exists for reducing buyout assistance to those who fail to purchase and maintain flood insurance. Doing so will not result in any significant increase in the purchase of flood insurance, but will have the unintended consequences of effectively penalizing the low-income populations most in need of federal assistance to move out of harm's way and of reducing the effectiveness of community's activities for flood mitigation. FEMA does not recommend taking any action based on the report's conclusions.

FEMA. (2000). ***FEMA Launches Project Impact Disaster Prevention Radio PSA*****. Washington, DC: FEMA.**
Keywords:
mitigation, Project Impact, media
Abstract: FEMA's Project Impact: Building Disaster Resistant Communities launched a combined television and radio public service announcement (PSA) campaign encouraging Americans to ask what their community is doing to become disaster resistant. The PSA followed two recent surveys regarding tornado and hurricane seasons. Survey respondents said they felt well prepared for disasters, but that they had not taken any prevention measures to prepare for natural disasters. In hurricane-prone states, 76 percent of respondents in northern states and 58 percent in southern states had not taken any prevention measures. The National Association of Broadcasters, which serves and represents America's radio and television stations, has taken on FEMA's Project Impact as a national campaign and will work to promote among its members the importance of prevention measures to reduce disaster damage.

FEMA. (2000). ***NASA joins FEMA's Project Impact Effort*****. Washington, DC: FEMA.**
Keywords:
mitigation, mapping, Project Impact, California, Virginia, Red River, North Dakota, Minnesota
Abstract: FEMA and the National Aeronautics and Space Administration (NASA) signed an agreement under which FEMA will use NASA science, technology, and remote-sensing research

in emergency management and disaster prevention activities. FEMA expected that the cooperative agreement would result in updated and more accurate maps of floodplains, a better understanding of wildfires and maps to improve disaster recovery and mitigation by state and local communities throughout the United States. The first cooperative activity under the agreement involved mapping floodplains in Los Angeles, CA; Sacramento, CA; Virginia Beach, VA; the Red River along the North Dakota and Minnesota border, and San Francisco, CA.

FEMA. (2000). ***National Flood Insurance Program Community Rating System: Biennial Report to Congress*****. Washington, DC: FEMA.**
Keywords:
Community Rating System, insurance premiums, mitigation
Abstract: This third biennial report submitted to Congress provides an overview of the Community Rating System (CRS) from inception to future directions. CRS was implemented in 1990 to recognize and encourage community floodplain management activities that exceed the minimum NFIP standards. Under the program, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting a community's implementation of creditable activities. The report describes the ten CRS classes (Class I requires the most credit points and gives the largest premium reduction). The report states that over 900 communities received discounted insurance premiums based on their implementation of measures that go beyond the NFIP's minimum requirements. The report also points out that these communities account for over 66 percent of the NFIP's policy base.

FEMA. (2000). ***Federal Insurance Administration: 2000 Stakeholder's Report*****. Washington, DC: FEMA.**
Keywords:
NFIP
Abstract: This report provides an annual update on the status of the NFIP. It details activities on policies, marketing, claims, and mitigation. At the close of fiscal year 2000, the NFIP covered 4.3 million policies in 19,117 communities. Claims payments on closed losses totaled over $192 million to 19,627 recipients. FEMA's Mitigation Directorate continued to address the issue of repetitive loss properties by identifying properties and targeting them for mitigation actions such as buyouts, relocation, and elevation. FIA provided a ranked list of more than 11,000 targeted properties to state officials for use in their own mitigation efforts.

FEMA. (2000). ***Opportunities to Enhance Compliance with Homeowner Flood Insurance Purchase Requirements.*** **Washington, DC: Office of Inspector General, FEMA**.
Keywords:
lending institutions, mandatory purchase, mapping, Special Flood Hazard Areas, flood zone determinations, compliance
Abstract: Of the 4,195 structures in the report's judgmental sample, 416 or 10 percent of the structures did not have flood insurance despite meeting the requirements for mandatory purchase. The report finds 30 percent of structures in the sample did not have coverage and purchase requirements did not apply to 20 percent due to Letters of Map Amendment and Letters of Map Revision, unregulated lenders, or no mortgage. Data from FIA suggests a non-compliance rate as high as 38 percent overall. The OIG recommends that to enhance compliance, FIA should study compliance levels in the post-disaster (flood) environment, should identify

structures that are remapped into a SFHA, should follow-up on lapses of flood insurance policies, and should encourage standards for flood zone determinations. Furthermore, the report encourages FIA to assess the impact of Group Flood Insurance Policies (GFIPs), a mechanism created in 1996 to help disaster victims in SFHAs comply with mandatory purchase, on the reduction of disaster costs.

FEMA. (2000). ***Partnership for a Safer Future: 2000 Annual Performance Report*****. Washington, DC: FEMA.**
Keywords:
strategic planning, agency operations and management
Abstract: This report explains how performance goals for FY 2000 contributed to FEMA's three strategic goals: to protect lives and prevent the loss of property from all hazards, to reduce human suffering and enhance the recovery after disaster strikes, and to ensure that the public is served in a timely and efficient manner. For example, one performance goal calls for the implementation of a repetitive loss strategy to reduce repetitive losses to the NFIP significantly. This performance goal would contribute to the achievement of the agency's first strategic goal. Some flood insurance-related performance goals include: evaluation of the effectiveness of the mitigation planning process and related initiatives at both the state and local levels, modernization of the floodplain-mapping program, and an increase in the number of flood insurance policies-in-force by 5 percent. The report also details management challenges identified in the FY 2000 *Annual Performance Plan* and explains representative FY 2000 evaluations.

FEMA. (2000). ***Project Impact: Building Disaster Resistant Communities*****. Washington, DC: FEMA.**
Keywords:
risk communication, Project Impact, awareness, mitigation, disaster planning
Abstract: With Project Impact: Building Disaster Resistant Communities, FEMA expects to change the way America manages disasters. Project Impact aims to help communities protect themselves from natural disasters. Project Impact bases its work and planning on three principles: preventive actions at the local level, private sector participation, and long-term efforts and investments in prevention measures. This report explains that in 1997, FEMA partnered with seven pilot communities across the country and was encouraged by the benefits realized and the local commitment that flourished. Project Impact quickly became a national initiative as more communities began to see the value in disaster planning and mitigation. Today there are nearly 250 participating communities, as well as more than 2,500 businesses that have joined Project Impact as partners.

FEMA. (2000). ***Project Impact: Identifying and Reporting Partner Contributions.***
Washington, DC: Office of Inspector General, FEMA.
Keywords:
federal programs, mitigation, Project Impact, disaster planning
Abstract: This report assesses the community mitigation grant initiative of NFIP's Project Impact and reveals several areas where the identification and reporting of partner contributions should be improved. The report recommends that FEMA take steps to increase the accuracy of reported partner contributions by issuing guidance to communities to identify contributions more

accurately and consistently and to improve its strategy for reporting quantifiable and nonquantifiable contributions so that valuable attitudinal and behavioral changes in communities are not overlooked. As the number of Project Impact communities grows, the report recommends that "best practice" examples be disseminated to share successful ideas and exemplary tasks and that FEMA realign its resources to better meet the increasing workload placed on regional coordinators. The report further recommends that FEMA educate communities about grant procedures, ensure that communities are selecting viable projects, and more closely monitor mitigation projects using federal funds so that the current trend of communities' slow spending of federal grant monies can be changed.

FEMA. (2000). ***Report on Costs and Benefits of Natural Hazard Mitigation*****. Washington, DC: FEMA.**
Keywords:
cost-benefit analysis, mitigation, strategic planning
Abstract: This report reviews the benefits of mitigation that can accrue to different segments of society, the costs incurred, the types of analyses needed to evaluate cost-effectiveness, the tools of hazard mitigation (including design and construction, land use planning, organizational plans, and hazard control and their implementation), and FEMA's mitigation programs. Sixteen case studies illustrate the diversity of mitigation measures that can address risk situations. The cases demonstrate that mitigation is effective against several types of natural hazards and can be accomplished through the use different mitigation tools. The report concludes that the mitigation of hazards is a long-term, community-based undertaking that relies on an investment from all sectors of the community, not just federal, state, and local governments. Mitigation often requires a structuring of incentives and relies on a recognition of the risks of natural disasters and the development of new methods to reduce these risks.

FEMA. (2000). ***Report of the Floodplain Management Forum*****. Washington, DC: FEMA.**
Keywords:
floodplain management, strategic planning
Abstract: This report summarizes the proceedings of the Floodplain Management Forum, held on June 8, 2000, in Washington, DC. A diverse group of experts on floodplain management participated in discussions of the future of floodplain management in the United States. Some of the major themes presented (though not necessarily agreed upon) by the participants include: shifting focus from flood-loss reduction to sustainable communities and protection of natural/beneficial functions of floodplains, encouraging and providing incentives for communities to develop master plans and hazard mitigation plans, developing more effective ways to communicate risks to citizens, considering the incorporation of components of CRS into NFIP regulations, and developing methods to improve flood insurance and eliminate subsidies.

FEMA. (2001). ***Audit of FEMA's Debris Removal Programs.*** **Washington, DC: Office of Inspector General, FEMA.**
Keywords:
debris removal, disaster assistance, disaster planning
Abstract: This report presents results of the OIG's audit of debris management and identifies the major problems related to debris removal confronting FEMA, states, and communities and FEMA's efforts to correct them. Local governments generally have responsibility for removing

debris following a disaster. However, local governments face challenges to removing debris such as estimating the amount of debris and the cost to remove it, awarding effective contracts, and monitoring the performance of contractors. FEMA helps local government overcome such problems through technical assistance, training, and guidelines. Despite timely efforts, fraud, waste, and abuse do occur. For example, the OIG identified $2.5 million in duplicate payments for debris removal between October 1992 and March 2000. In another case, a subcontractor hired to remove debris in Omaha, NE, intended to increase the amount of debris hauled and thus profit by cutting healthy trees. The contractor then dumped this ineligible debris at official dumpsites. Based on results from the audit, the OIG recommends FEMA provide timely assistance following a disaster requiring debris removal, expand training in debris removal for emergency managers at all levels, explore ways to improve the delivery of technical assistance to state and local officials, develop a mechanism to enter data on debris into NEMIS, and provide relevant parties with written instructions to avoid duplication of payments or benefits.

FEMA. (2001). ***Buyouts: Hurricane Floyd and Other Issues Relating to FEMA's Hazard Mitigation Grant Program*****. Report to the Chairperson, Subcommittee on VA, HUD, and Independent Agencies, Committee on Appropriations, US Senate. Washington, DC: Office of Inspector General, FEMA.**

Keywords:
buyouts, cost-benefit analysis, Hazard Mitigation Grant Program, Hurricane Floyd, relocation

Abstract: This report summarizes the Office of Inspector General's findings concerning money allocated for buyout and relocation programs (P.L. 106-113 and P.L. 106-246) following Hurricane Floyd. Congress asked the OIG to determine whether FEMA's buyout estimates are accurate and to provide an assessment of FEMA's oversight procedures. The report's first section focuses on: (a) the process used to identify buyout structures; (b) the method used to estimate the total cost of the buyout; (c) the impact of other sources of disaster assistance on buyout decisions; (d) the process developed for allocating funds; and (e) the procedures used for cost-benefit analysis. The second section addresses concerns regarding the implementation of the Hazard Grant Mitigation Program (HGMP) and develops recommendations for action and issues for further review. The final section of the report recommends ways to improve HMGP.

FEMA. (2001). ***Coastal Barrier Resources System: FEMA's Management Controls Governing the Prohibition of Flood Insurance*****. Washington, DC: Office of Inspector General, FEMA.**

Keywords:
Coastal Barrier Resources System, legislation, Write Your Own Program, communication, Alabama, Florida, Rhode Island, South Carolina

Abstract: FEMA's OIG conducted this review of internal controls to prevent the sale of flood insurance to properties within the Coastal Barrier Resources System (CBRS). The OIG reviewed relevant legislation and regulations governing CBRS and the prohibition on the sale of flood insurance to these properties. The OIG also examined files maintained for resolution of policies issued in CBRS and reviewed all policies indicated to be potentially within the CBRS in Alabama, Florida, Rhode Island, and South Carolina. Interviews with officials at FIMA as well as contractors who have a role in CBRS compliance requirements and Write Your Own (WYO) companies involved in the sale of insurance in or near CBRS areas were conducted. First, the OIG found that policies potentially in CBRS were not always fully processed or reported due to a lack of accurate community identification, a low level of confidence in addresses, and outdated

data from FIRMs. The OIG recommends that all policies be fully processed using the Geographic Policy Edit System even when only incomplete information is available and that policies for properties potentially in CBRS be reported to WYO companies and FIMA's Direct Serving Agent for further clarification. Second, the OIG examined how policies for properties identified as potentially in CBRS are resolved. The OIG found that of the policies examined, about 46 percent had no record of determination. The report recommends that FIMA require resolution of all cases where there is no record and encourage use of the US Fish and Wildlife Service to resolve unclear properties. Lastly, the OIG recommends that FIMA explore the possibility of requiring the resolution of a property potentially in CBRS prior to issuing a policy.

FEMA. (2001). ***Compliance with Public Assistance Program's Insurance Purchase Requirements.*** **Washington, DC: Office of Inspector General, FEMA.**
Keywords:
public assistance, mandatory purchase
Abstract: This inspection assesses compliance with the insurance purchase requirements required by FEMA's Public Assistance Program, the insurance review process for the program, insurance applicability issues, and possible rule changes for insurance. With respect to compliance with insurance purchase and maintenance requirements, the inspection revealed that 34 percent of the projects were not maintaining insurance, 39 percent of the project files did not contain acceptable evidence of insurance, and some projects were purchasing less insurance than required. With respect to the insurance review process, the report recommends that FEMA take specific steps to improve the quality of the documentation accepted as proof of insurance for projects in order to decrease the likelihood of FEMA providing unnecessary assistance. The report also recommends that FEMA regularly monitor public entities to ensure their maintenance of insurance on public buildings that previously received public assistance. The report proposes an option for a proposed rule that would help eliminate current disincentives, streamline insurance reviews, and encourage state and local governments to obtain insurance coverage.

FEMA. (2001). ***Final Annual Performance Plan: Fiscal Year 2002.*** **Washington, DC: FEMA.**
Keywords:
strategic planning, agency operations and management
Abstract: This plan outlines the strategic goals and objectives that FEMA will pursue during FY 2002. The plan illustrates how FEMA will execute its mission to "reduce the loss of life and property and protect our institutions from natural and technological hazards by leading and supporting the nation in a comprehensive, risk-based emergency management program of mitigation, preparedness, response, and recovery." The following goals are identified: (a) support the development of disaster resistance in communities and states; (b) collect, validate, and refine building and flood-loss data and confirm that the reduction in estimated losses from NFIP activities exceeds $1 billion; (c) increase the number of NFIP policies in force by 5 percent, with the active assistance of new and existing program partners; and (d) improve the "bottom line" or combined loss and expense ratio by 1 percent.

FEMA. (2001). ***Modernizing FEMA's Flood Hazard Mapping: A Progress Report.*** **Washington, DC: FEMA.**
Keywords:

mapping, agency operations and management, strategic planning
Abstract: FEMA developed a plan in 1999 to modernize its program of mapping flood hazards. The plan outlined the steps necessary to update FEMA's flood maps for the nation to digital format and to streamline FEMA's operations in raising public awareness of the importance of the maps and responding to requests to revise them. This report summarizes the progress made toward implementing the plan during FY 2000 and part of FY 2001. Section I overviews the plan and summarizes its benefits and the funding requirements. Section 2 discusses the Cooperating Technical Partners (CTP) initiative to increase formal relations with efforts at the federal, state, regional, and local levels. These relations will result in strengthened mapping and floodplain management programs and thus should reduce losses from floods and disaster assistance. Section 3 explains how technology plays a role in FEMA's flood mapping program. Digital maps, for example, will allow FEMA to distribute DFIRMs on CD-ROM and through the Internet. The final section of the report discusses the progress made on the various objectives of the plan including the adoption and distribution of revised guidelines on determining flood hazards on alluvial fans.

FEMA. (2001). ***Status of Funds Awarded under the Hazard Mitigation Grant Program and Other Project Management Issues*****. Washington, DC: Office of Inspector General, FEMA.**
Keywords:
Hazard Mitigation Grant Program, mitigation, agency operations and management
Abstract: This report evaluates the status of awards under the Hazard Mitigation and Grant Program (HMGP) and examines factors impacting timely distribution of funds and completion of mitigation projects. The report concludes that the large balance of undisturbed funds is due to the inability of FEMA, state, and local governments to spend available funds and implement projects in a timely manner and it is neither fiscally prudent nor responsible for FEMA to carry such large balances. Another factor is FEMA's failure to consider state and local capacity before providing grants and the weakness of program designs. The report makes a series of recommendations about how the program could be more effectively implemented, including allocating funds on an annual basis, creating broader incentives for states to expedite mitigation projects, and establishing a competitive process for deobligated funds. The report finds that FEMA has addressed some of the recommendations made in the report and has made progress in shortening the project approval timeframes, however several recommendations remain unresolved.

FEMA. (2002). ***A Nation Prepared: FEMA Strategic Plan Fiscal Years 2003-2008*****. Washington, DC: FEMA.**
Keywords:
dams, economic impacts, federal programs, flood disaster planning, floodplain management, hurricanes, insurance, mitigation, natural disasters, NFIP, relocation, agency operations and management
Abstract: This document outlines FEMA's organizational vision and sets goals for FY 2003 through FY 2008. It introduces a shift in focus to include not only natural disasters but also responses to terrorist attacks. A continued emphasis during this time will be on mitigation and insurance. FEMA presents its goals, objectives, and strategies that will allow the agency to realize its vision. The six main goals are to (1) reduce loss of life and property, (2) minimize suffering and disruption caused by disasters, (3) prepare the nation to address the consequences of terrorism, (4) serve as the nation's portal for emergency management and expertise, (5)

develop and support its workforce, and (6) continue to improve the agency through performance-based management and meeting customer needs. Appendices include an outline of the goals presented throughout the plan, an outline of FEMA's core values, information on FEMA's regional office, a summary of major authorities, crosscutting partnerships with other federal agencies (including many in floodplain management and insurance), and a glossary.

FEMA. (2002). *CRS Coordinator's Manual.* Washington, DC: FEMA.
Keywords:
Community Rating System, floodplain management
Abstract: This edition provides an update to the manual released in 1999. It includes the *CRS Schedule*, which sets criteria for CRS classification, and *CRS Commentary* on the *Schedule*. Section 100 gives general background information on the system. Section 200 explains the procedures for applying for a CRS classification. Sections 300 through 700 explain the credit points and calculations used to verify CRS credit. A community uses procedures in these sections to submit a modification for a better CRS classification. Based on comments and recommendations received by FEMA and the Community Rating System Task Force, the 2002 edition makes several major changes including but not limited to, the attainment of Class 1 status only through a community's adoption of the "No Adverse Impact" approach to eliminate or minimize future flood losses and the receipt of credit for repetitive losses acquired, retrofitted, or relocated outside the SFHA and the receipt of double credit for those within the SFHA.

FEMA. (2002). *Community Rating System: Effectiveness and Other Issues*. Washington, DC: Office of Inspector General, FEMA.
Keywords:
Community Rating System, floodplain management
Abstract: This report presents findings from the OIG on the effectiveness of CRS as a tool to improve the policies and practices of local floodplain management. Data to confirm that CRS activities effectively reduce dollar exposure to the NFIP are currently unavailable. Nevertheless, CRS is a disciplined program with well-defined requirements, clearly written guidelines, and detailed rating processes and procedures. However, FEMA could further enhance the effectiveness of the CRS program by (1) performing Community Assistance Visits (CAVs) in all CRS communities; (2) marketing CRS to communities having greater exposure to the NFIP; (3) providing credit for increasing insurance coverage in the community; and (4) providing CRS Coordinators with access to claims data. Also, FEMA should consider (1) discontinuing discounts for pre-FIRM properties; (2) requiring insurance to the cumulative level of assistance provided; and (3) requiring a greater commitment to uniform building codes and measurable criteria for entry into CRS. According to the OIG, these actions would not only improve the effectiveness of CRS but also would reduce exposure to the NFIP and lessen disaster costs.

FEMA. (2002). *CRS Training Needs Assessment.* Human Technology.
Keywords:
awareness, coastal areas, communication, Community Rating System, compliance, enforcement, floodplain management, insurance, NFIP, risk communication, training
Abstract: Human Technology conducted telephone interviews to determine the perceived training needs within CRS communities. Seven communities were contacted and interviewed from each of four categories (large and small coastal communities and large and small inland

communities). The report presents a summary of initial findings and the questions and respondent's verbatim answers. Overall, the survey found that the greatest challenges facing CRS coordinators in implementing floodplain management include compliance and enforcement, educating the public about risk and flood insurance, and inaccurate data. Most of the respondents had previous training in formal workshops, and 72 percent of respondents indicated training could improve CRS participation and floodplain management. Included in the topics they would like to receive training in was training designed to help with compliance issues. Respondents want short, focused workshops that are site-specific (tailored training) and conducted within their locality.

FEMA. (2002). ***Duplication of Benefits: National Flood Insurance Program and the Disaster Housing Program's Minimal Repair Grants.*** **Washington, DC: Office of Inspector General, FEMA.**

Keywords:
disaster assistance, public assistance, federal programs, agency operations and management

Abstract: This report presents results regarding duplication of benefits (DOB) between the NFIP and the Disaster Housing Program's Minimal Repair Grants. A sample of seven disasters revealed 863 cases of potential DOB totaling $3.5 million. Of these 863 cases of potential DOB, FEMA notified 156 to return funds and received full or partial payments from only 89. Furthermore, data inconsistencies between the NFIP and NEMIS databases impede the efficient and effective identification of potential DOB. Based on these results and observations, the reports makes the following recommendations to FEMA: (1) develop consistent data entry and maintenance standards for key data elements maintained in the NFIP and NEMIS databases; (2) develop an automated interface, data warehouse capability to query key data elements between the NFIP and NEMIS databases prior to paying for minimal repairs; (3) perform post-disaster database comparisons as an interim measure until an automated system is operational; (4) follow up on the DOB cases identified during this review and initiate recoupment action, as appropriate; and (5) enhance the debt collection process under the Disaster Housing Program to ensure the DOB is identified and recovered in a reasonable time frame.

FEMA. (2002). ***Extent that Mitigation Funds are Used to Address Repetitive Flood Loss and Other Related Issues.*** **Washington, DC: Office of Inspector General, FEMA.**

Keywords:
repetitive losses, Hazard Mitigation Grant Program, Flood Mitigation Assistance Program, mitigation

Abstract: As incidents of widespread flooding persist, the number of insured properties suffering repetitive flood losses continues to cause financial hardship for the NFIP. This report assesses the extent to which mitigation funds are being used to address the problem of repetitive flood loss and makes recommendations in three areas. First, HMGP and the FMA Program cannot adequately address repetitive flood loss properties without exemption from or elimination of certain policies including time limits and formulas used for allocating funds. Second, the collection and dissemination of data on repetitive flood loss properties needs improvement with regards to accuracy, consistency, and usability. Finally, FEMA and state officials can better use NEMIS to manage the repetitive loss problem. The report also notes several impediments faced by property owners to mitigate including the inability to share the costs, a lack of knowledge about mitigation opportunities, and the availability of subsidized flood insurance.

FEMA. (2002). *Financial and Statistical Compendium: Fiscal Year 2001*. Washington, DC: FEMA.

Keywords:
NFIP

Abstract: Formerly called the Stakeholder's Report, this compendium provides an annual update on the status of the NFIP. It details activities on policies, repetitive losses, claims, mitigation, and CRS. At the close of fiscal year 2001, the NFIP had 4,476,836 policies providing over $617 billion in coverage. Total flood loss payments exceeded $1.2 billion. The report also includes an actuarial rate review that determines operating profit/deficit annually for 1978 through 2000. As part of FEMA's strategy for targeting repetitive loss structures, payments on repetitive loss structures are reported for each state. The report also contains information on the number and distribution of CRS communities and examples of activities funded by the Flood Mitigation Assistance (FMA) Program and the Hazard Mitigation Grant Program (HMGP).

FEMA. (2002). *Guidelines and Specifications for Flood Hazard Mapping Partners.* Washington, DC: FEMA.

Keywords:
mapping

Abstract: This report defines technical requirements, product specifications for FIRMs and products related to the NFIP, and associated coordination and documentation activities. These guidelines combine FEMA technical, programmatic, and administrative procedure publications, guidance documents (listed below), and memoranda regarding the mapping of flood hazards. The guidelines also reflect recent changes to processes and products associated with the implementation of MMP, including the Cooperating Technical Partners (CTPs) initiative and new procedures for scoping projects. Unless specfically indicated otherwise by FEMA for a particular contract or agreement, these guidelines supersede previous FEMA guidelines and documents regarding the preparation of FIRMs, including, but not limited to, the following:

- Flood Insurance Study Guidelines and Specifications for Study Contractors (FEMA 37, January 1995) and any previous revisions thereof;
- Airborne Light Detection and Ranging Systems (Appendix 4B to FEMA 37, May 2000)
- Guidelines and Specifications for Flood Map Production Coordination Contractors (Final Draft, February 17, 1999);
- Guide for Preparing Technical Support Data Notebook (January 1990);
- Guidelines for Determining Flood Hazards on Alluvial Fans (February 23, 2000);
- Guidance for Scoping Flood Mapping Projects (January 12, 2001);
- Guidelines and Specifications for Wave Elevation Determination and V Zone Mapping (March 1995);
- Guidelines and Specifications for Wage Elevation and Determination and V Zone Mapping – Great Lakes (October 1994);
- "Procedures for Collecting, Depositing, and Reporting Fees Under Part 72 of the NFIP Procedures" (undated);
- "Procedures for the Administration of FEMA's Fee-Charge System" (undated);
- DFIRM Graphic Specifications (November 2000); and
- Standard DFIRM Database Guidelines and Specifications (May 2001).

FEMA. (2002). ***HAZUS Market Characterization Study*****. Washington, DC: FEMA.**
Keywords:
HAZUS, hazard identification, disaster planning, risk assessment, risk management, risk communication, marketing
Abstract: FEMA's mission is to reduce loss of life and property and protect the nation's built environment from a full range of hazards. To support that mission, FEMA created a risk-based management tool called Hazards U.S. (HAZUS). FEMA developed HAZUS in cooperation with the National Institute of Building Sciences (NIBS), as a nationwide, standardized computer-based tool to assist in planning for and estimating costs due to earthquakes. HAZUS has been expanded to include two new modules for flood and wind hazards. This study was designed to provide external, or "market pull," and internal, or "market push," analysis to better understand current and potential HAZUS users and their requirements and to provide a methodology and planning tool for developing training and projections for technical support. The market study considers both existing (earthquake) and evolving (wind and flood) HAZUS Multi-Hazard (MH) capabilities for estimating losses from disasters. The findings of the market study will provide the basis for the formation of a HAZUS MH marketing strategy. Major findings and recommendations include: an analysis of the potential effects of market pull and market push scenarios; insights provided by various user tiers defined by their roles, user organizations, user geography; top five findings from the HAZUS market study presented within the framework of the Four Ps of Marketing (Product, Price, Place, and Promotion); recommendations relating to training and technical support; findings regarding future needs and directions; and recommendations regarding next steps.

FEMA. (2002). ***Invalid Preferred Risk Policies Based on Loss History*****. Washington, DC: Office of Inspector General, FEMA.**
Keywords:
insurance coverage, insurance premiums, repetitive losses, Write Your Own Program
Abstract: A preferred risk policy (PRP) has a lower premium than a Standard Flood Insurance Policy and is available for structures located in low to moderate risk areas. A structure loses its eligibility for a PRP if it has received two flood insurance payments or two disaster relief payments, more than $1,000; three flood insurance payments or three disaster relief payments, regardless of the amount; or one flood insurance payment and one disaster relief payments more than $1,000. In this report, the OIG reviewed policies with a repetitive loss history in Florida, Louisiana, Mississippi, Missouri, North Carolina, and Texas to determine which were written as preferred risk. As of March 2002, there were 437 active PRPs providing flood insurance on repetitive loss structures in the sample examined. FIA had not identified 332 or 76 percent of these PRPs as invalid. Furthermore, of the 437 PRPs on structures with a repetitive loss history, 56 or 13 percent had received enough disaster relief payments to make them ineligible to receive a PRP. Based on its findings, the OIG recommends FIMA should analyze the feasibility of using a unique property identifier such as the Tax Parcel Identification Number on paperwork, review monitoring procedures to ensure WYOs resolve errors in a timely manner, and develop consistent data entry and maintenance standards for elements maintained in the NFIP and NEMIS databases.

FEMA. (2002). ***National Flood Insurance Program Community Rating System: Biennial Report to Congress*****. Washington, DC: FEMA.**

Keywords:
Community Rating System, insurance premiums, mitigation
Abstract: As of October 2002, policyholders in 959 communities receive premium discounts on flood insurance because of implementation of local mitigation, outreach, and educational activities that exceed the NFIP's minimum requirements. Although premium discounts are one of the benefits of participation in CRS, it is more important that these communities are implementing activities that save lives and reduce property damages. The 959 communities represent a significant portion of the nation's flood risk; they account for 66 percent of the NFIP's policy base. The program has been steadily growing over the past five years. CRS communities are improving their practices of floodplain management and receiving better CRS classifications in return. Part 1 of this report provides summary statistics on community participation in CRS and on the cost of administering the program. Part 2 reviews how CRS operates and how the program activities are implemented. Finally, Part 3 describes the progress toward the four strategic goals posed in prior reports: support for mitigation programs, improvement of classification for communities already participating in CRS, encouragement of communities to join CRS, and encouragement of local officials to use an all-hazards approach in planning.

FEMA. (2002). ***National Flood Insurance Program: Specific Rating Guidelines*****. Washington, DC: FEMA.**
Keywords:
submit-for-rate, insurance coverage, insurance premiums, risk assessment
Abstract: There are certain properties at high flood risk that, because of peculiarities in their exposure to flooding, do not lend themselves to the pre-programmed insurance rates outlined in the *Flood Insurance Manual*. These risks require an in-depth underwriting analysis before a risk premium can be applied. Rates for these properties do not appear in the flood manual, but are referred to as submit-for-rates. This guide provides rules and rates for submit-for-rate risks organized into three sections: non-elevated buildings, elevated buildings, and miscellaneous. Overall, the procedures in the guide aim to meet the NFIP's two-fold goal of establishing sound actuarial rates and obtaining information for enforcing floodplain management.

FEMA. (2003). ***Audit of FEMA's Use and Management of Flood Mapping Contractors*****. Washington, DC: Office of Inspector General, FEMA.**
Keywords:
mapping, agency operations and management
Abstract: This report addresses the work done by three Flood Map Production Coordination Contractors (mapping contractors). The OIG audited $71 million provided to mapping contractors to determine whether FEMA achieved critical mapping goals by using contractors and adequately managed and monitored mapping contracts and costs. The audit revealed that FEMA's management of mapping contracts needs strengthening. For example, for one mapping contract, 13 invoices totaling $1.1 million were paid using the incorrect funds because accounting staff ignored accounting codes (i.e., funding information) provided by the project officer and assigned incorrect codes to the invoices. Furthermore, the audit also found that while the contractors met some requirements and achieved some goals for mapping, only 16 percent of contract funds were spent on a major goal: updating old maps. According to the OIG, FEMA may have the ability to update more maps if it reduces spending on processing Letters of Map

Change, which accounted for 32 percent of contract spending over fiscal years 2000 and 2001, and revises contracting strategies to increase competition and give contractors incentives to control costs. FEMA should give special attention to contractual arrangements for administration and support, which accounted for 27 percent of contract spending.

FEMA. (2003). *Flood Insurance Manual*. Washington, DC: FEMA.
Keywords:
NFIP, insurance agents, insurance coverage
Abstract: The *Flood Insurance Manual* provides information for use by those insurance companies and agents who write flood insurance policies. This edition, effective May 1, 2003, supersedes all previous editions of the *Manual*. Some of the changes in the edition include increases to the rates, elimination of the expense constant, an increase to the limit of liability under Increased Cost of Compliance (ICC), and an updated list of communities participating in the Community Rating System. The *Manual* also lists those communities where the identification of coastal barriers or Otherwise Protected Areas (OPAs) prohibits all federal expenditures or financial assistance, including flood insurance.

FEMA. (2003). *Floodplain Management Training Strategy*. Human Technology.
Keywords:
awareness, Base Flood Elevation, coastal areas, communication, Community Assistance Visits, Community Rating System, compliance, disaster assistance, enforcement, floodplain management, insurance, mapping, media, training, repetitive losses, risk communication, riverine areas, Stafford Act, substantial damage, variances
Abstract: FEMA intends to use this report as a basis for future changes in training. The report summarizes the responses of nine FEMA regional staff members, 26 NFIP state floodplain coordinators, and 53 local floodplain management officials to questions about training needs at the regional, state and local level, and provides recommendations to improve training. Recommendations include offering training on-site (in addition to the resident course at EMI), dividing broader topics into smaller "modular" courses, providing training materials in multiple formats, sponsoring opportunities for regional and state floodplain coordinators to meet and share ideas, developing an advanced NFIP course, mandating that each local community develop administrative procedures (provide training on developing procedures, and a regulation to ensure compliance), requiring training for local floodplain management officials, and providing resources to the communities including official communication from FEMA to local government officials to persuade them of the value of training; simple, visually appealing brochures for local use; and public service announcements for local communities to air on local television and radio. Specific questions addressed in the surveys include the type of training available, the type of training needed, how the need for basic training compares with the need for more advanced training, the barriers that exist to providing or attending training, and the benefits that have resulted from NFIP training.

FEMA. (2003). *The 1993 Great Midwest Flood: Voices Ten Years Later*. Washington, DC: FEMA.
Keywords:

Midwest floods of 1993, Illinois, Wisconsin, Missouri, Kansas, North Dakota, Minnesota, South Dakota, Nebraska, floodplain management, mitigation, insurance coverage, insurance purchase decision

Abstract: The Great Midwest Flood of 1993 was among the most devastating natural disasters in the nation's history. Flooding destroyed or damaged 50,000 homes and completely inundated 75 communities. A study by the Interagency Floodplain Management Review Committee in 1994 estimated property damages between $12 and $16 billion. This report contains a collection of success stories that document what effective mitigation can do to prevent future flood disasters. Most of these stories come from existing sources. The report also includes narratives from several "veterans" of the Great Midwest Flood of 1993 who had flood insurance policies and subsequently urged other property owners to purchase coverage. Remembering its devastation, 10 years later, may help other property owners and communities at risk from flooding become more aware of the harm that floods can inflict on lives, property, and infrastructure. This 10th-anniversary anthology should also serve as a source of inspiration and encouragement for those communities and property owners at risk from flooding. They can take measures today to reduce their physical and financial risk from flood hazards in the future.

FEMA. (No Date). ***National Flood Insurance Program Requirements for Substantial Improvement: Guidance Document for Community Officials*****. (Draft). Washington, DC: FEMA.**

NOTE: This document was never made final although policies from it have been incorporated into other guidance. Remaining policies will be incorporated into a guidance document currently underway.

Keywords:
substantial improvement, substantial damage, compliance, enforcement, variances, insurance premiums, mobile homes, property values, permits, building codes, floodplain management, zoning

Abstract: This guidebook is designed to assist local floodplain management officials in administering the NFIP's requirements for substantially improved structures. The document contains a detailed description of the various categories of substantially improved structures, the specific floodplain management regulations that apply to these structures, and how to determine whether a particular structure is considered a substantial improvement. The implications for flood insurance rates under various scenarios are also provided. Several appendices provide additional references and sources of information as well as a list of federal and state floodplain management contacts and a substantial improvement checklist.

Federal Highway Administration. (1980). ***Assessment of the Impact of the National Flood Insurance Program on Highways*****. Washington, DC: Federal Highway Administration.**

Keywords:
federal programs, hydrology and hydraulics

Abstract: This report examines the impact of floodplain management programs and regulations on the Federal Highway Administration and highway agencies. Highway encroachment designs are evaluated for economic risk of regional hydrology, stream hydraulics, potential flood losses in terms of damage to structure, upstream flooding due to backwater, stream erosion, and costs due to loss of transportation route. The analysis found that NFIP regulations are reasonable in some instances and pose a barrier to hydraulic engineering and highway design in others.

Executive Order 11296, Flood Hazard Evaluation, compels the Federal Highway Administration to design encroachments built with federal aid consistent with the standards of the NFIP where a floodway has been designated. The most significant problems the survey found were confusion resulting from the complexity of the NFIP, the perception that adherence to NFIP regulations would increase highway costs, and technical deficiencies in mapping to help enforce NFIP regulations. The study notes that the Federal Highway Administration and the NFIP have fundamentally different approaches to reducing flood damages: the former seeks cost-effective solutions to site-specific problems while the latter applies a single uniform definition of minimum standards for all floodplains.

Federal Interagency Task Force on Floodplain Management. (1986). ***A Unified National Program for Floodplain Management.*** **Washington, DC: FEMA.**
Keywords:
Unified National Program, floodplain management, mitigation, environmental policy, public policy, federal programs
Abstract: The status of federal, state, and local floodplain management activity as of mid-1985 is reflected in this revised report and in its findings and recommendations. Like its predecessor, the revised report does not seek to provide specific guidance for meeting federal program requirements. Rather, the report seeks wise decisions and management for the nation's floodplains to reduce losses of life and property from flooding and losses of natural and beneficial values from unwise land-use. A conceptual framework provides general guidance for decision making at the federal, state, and local levels as well as in the private sector. The strategies and tools for flood loss mitigation and for the preservation and restoration of natural floodplain values are presented in detail. Actions are recommended to facilitate the coordination of management programs dispersed among all levels of government.

Federal Interagency Task Force on Floodplain Management. (1987). ***Further Advice on Executive Order 11988 Floodplain Management.*** **Washington, DC: FEMA.**
Keywords:
Unified National Program, floodplain management, federal programs
Abstract: This document provides guidance by discussing specific and commonly recurring issues and by providing examples that show how to implement the provisions of Executive Order 11988, Floodplain Management; it will not resolve all issues or questions. The guidance, directed at federal agencies, state, and local governments, supplements the still valid floodplain management guidelines issued by the Water Resources Council in 1978. The document is divided into two principal parts. The first provides an interpretation on several issues that continue to present problems to those responsible for implementing the order, and the second represents a series of scenarios that illustrate how to address those issues when implementing the order. Scenarios have been grouped together to provide a broad spectrum of federal actions in the context of the executive order. The categories of federal actions range from those over which a federal agency has direct control to those where responsibility has been delegated to the local level. While the scenarios may appear to be addressing an action undertaken by a specific agency, they are intended to be generic and applicable to federal agencies with similar responsibilities and programs.

Federal Interagency Task Force on Floodplain Management. (1992). *Floodplain Management in the United States: An Assessment Report,* 2 volumes. *Vol. I – Summary Report.* Boulder, CO: University of Colorado Natural Hazards Information Center. *Vol. II – Full report*. Washington, DC: Government Printing Office.

Keywords:
floodplain management, Unified National Program, awareness

Abstract: This assessment of floodplain management in the United States is a report to the public and to Congress on progress made toward implementing *A Unified National Program for Floodplain Management*. It states that although a truly unified national program to manage floodplains is not yet in place, great strides have been made in that direction. Awareness of flood hazards, particularly among public officials, has clearly increased, while loss of life and injury due to flooding has been curtailed. Nationwide mapping of flood-prone areas by FIA has resulted in the initial mapping of more than 12,000 communities and the restudy of over 1,700 communities since coordinated studies began in the 1960s. Eighty-two percent of all flood-prone communities in the United States have joined the NFIP. Computers are increasingly being incorporated into floodplain management and now facilitate such functions as hydrologic modeling, flood warning, and floodplain mapping. The study also declares that modifying flooding has traditionally been the most popular strategy for reducing floodplain losses because the states or federal government conduct most of the planning, funding, construction, and implementation for structural measures and because local and individual adjustments or sacrifices are minimal. Although there is increased recognition of possible adverse effects of these approaches, they are still needed, particularly to protect existing development. In contrast, the strategy of restoring and preserving the natural and cultural resources of floodplains has had little exposure to date and needs to be better integrated both with other floodplain management tools and strategies and with efforts in other fields, such as river corridor management and pollution control.

Federal Interagency Task Force on Floodplain Management. (1994). *A Unified National Program for Floodplain Management.* Washington, DC: FEMA.

Keywords:
floodplain management, Unified National Program, public policy

Abstract: This report provides a conceptual framework for floodplain management that includes a statement of overall purpose, definitions, working and general principles, and managerial strategies and tools. The report also suggests setting national goals and a timetable for their achievement, providing for periodic evaluations of the status of floodplain management, defining the roles and responsibilities of each level of government and the private sector. Floodplain management aims to achieve a reduction in the loss of life, disruption, and damage caused by floods and the preservation and restoration of the natural resources and functions of floodplains (which, in turn, lessens damage potential). There are four main strategies for managing floodplains: (a) modifying human susceptibility to flood damage and disruption, (b) modifying the impact of flooding on individuals and the community, (c) modifying flooding, and (d) preserving and restoring the natural resources of floodplains. Under this framework, the decisions of floodplain managers involve choosing the best mixture of strategies and tools, balancing competing uses, weighing costs and benefits, and evaluating various alternatives. To ensure that the result of this ongoing decision-making process is improving the status of floodplains, four broad goals have been recommended, along with a list of objectives that must

be accomplished to reach them. The goals include: (a) formalizing a national goal-setting and monitoring system for floodplain management; (b) reducing, by at least half, the risks to life, property, and the natural resources of floodplains; (c) developing and implementing a process to encourage positive attitudes toward floodplain management; and (d) establishing capacity for in-house floodplain management.

Federal Interagency Task Force on Floodplain Management. (1996). *Protecting Floodplain Resources: A Guidebook for Communities*. Washington, DC: FEMA.
Keywords:
floodplain management, strategic planning, environmental protection, wetlands, hydrology and hydraulics, environmental impacts, natural resources
Abstract: This guidebook has been written to introduce officials and citizens at the local level to the basic understanding of natural resources in floodplains and to offer suggestions for creating strategies for wisely managing these areas. The overall objective is to educate community officials and citizens about issues in floodplain management so they can take action toward conserving and restoring the natural resources of floodplains. Whereas case studies will showcase communities that have successfully implemented such projects, a step-by-step formula for universal application to all communities would be unrealistic. Rather, the guidebook is intended as a starting point and a resource for ideas so communities can utilize current knowledge about the natural resources of floodplains in order to customize floodplain management projects to a unique local context. Chapters 2 and 3 provide an explanation of natural floodplains. Chapters 4 and 5 suggest ways to plan for and manage the natural resources of floodplains. The guidebook's case studies illustrate the variety of approaches that can be taken to avoid future problems in floodplains and show how to take advantage of the assets that rivers and streams offer to a community.

Flood Hazard Mitigation Advisory Committee with the Hazard Mitigation Technical Assistance Partnership, Inc. for the South Carolina Department of Natural Resources. (1999). *Flood Hazard Mitigation: A Plan for South Carolina*. Columbia, SC: South Carolina Department of Natural Resources.
Keywords:
South Carolina, floodplain management, mitigation
Abstract: This reports discusses the effects of flooding on South Carolina and its citizens and outlines an appropriate strategy for mitigating flood hazards. The mitigation measures drafted and recommended by the South Carolina Flood Hazard Mitigation Advisory Committee take the form of seven general objectives listed in an action plan. The objectives include coordinating state and federal flood mitigation programs so they will operate more effectively and efficiently, providing flood data and maps to support mitigation programs, regulating future development to prevent increasing flood hazards and losses, protecting existing development from flood damage, providing of warning and emergency response activities to protect lives and property during a flood, supporting and improving local mitigation programs, and providing flood protection information to property owners.

Flood Hazard Team. (2000). *Earth Observation Satellites for Flood Management, Flash Flood Analysis and Prediction*. Committee on Earth Observation Satellites, Disaster Management Support Group.

Keywords:
mapping
Abstract: The Committee on Earth Observation Satellites Disaster Management Support Group "supports natural and technological disaster management on a worldwide basis by fostering improved utilization of existing and planned Earth Observation (EO) satellite data." This report addresses the use of Earth Observation satellites by floodplain managers and other users and for flash flood analysis and prediction. The report concludes that the potential of high and low resolution polar orbital Earth Resource Satellites have been shown to be an excellent tool for providing hydrological information. A family of satellite-derived products from the operational meteorological satellites (geostationary and polar) for application to general flood and flash flood analysis and prediction is also presented. Gaps in remote sensing capabilities are discussed and future improvements and requirements are presented. The ultimate goal is to integrate geostationary with polar orbital data and to have microwave onboard geostationary satellites early in the next millennium.

Flood Insurance Interagency Task Force. (1998). *Enforcement and Compliance Procedures Necessary to Carry Out the Provisions of the National Flood Insurance Reform Act (NFIRA): Final Report to Congress*. Washington, DC: Flood Insurance Interagency Task Force.
Keywords:
enforcement, mandatory purchase
Abstract: The Flood Insurance Interagency Task Force conducted several studies resulting in a series of actions, conclusions, and recommendations. These include (a) the development of a compliance model checklist to provide a general framework for the comparison of existing flood insurance compliance programs, (b) the development of a catalog of compliance assistance materials to ensure adequate compliance with the laws governing flood insurance, (c) the conclusion that a reasonable degree of standardization of enforcement exists within the organizations responsible for implementation, and (d) the assessment of the reasonableness of fees charged by the flood zone determination industry.

Florida Department of Community Affairs. (2000). *A Local Official's Guide to Implementing the National Flood Insurance Program in Florida*. Tallahassee, FL: Florida Department of Community Affairs.
Keywords:
Florida, NFIP, floodplain management, mitigation, compliance, enforcement, development, mapping, substantial damage, substantial improvement, variances, Community Rating System, Flood Mitigation Assistance Program, Hazard Mitigation Grant Program, federal programs
Abstract: Approximately 95 percent of all communities in Florida participate in the NFIP. This guidebook is intended to serve as an educational and informational document for local floodplain administrators. Chapter topics include mapping, regulations, local administration, administrative problems, substantial improvements, variances, enforcement, and related programs. Chapter 9 discusses the Community Rating System (CRS), Flood Mitigation Assistance (FMA) Program, and Hazard Mitigation Grant Program (HMGP). The appendices provide sources of technical assistance and a bibliography.

Fordham, Maureen. (1999). Participatory planning for flood mitigation: Models and approaches. *Australian Journal of Emergency Management,* 13(4), 27-34.

Keywords:
floodplain management, mitigation, socioeconomic impacts, Oklahoma, Colorado, England, Bangladesh, Portugal
Abstract: Planning for floods is a complex endeavor. This paper critically examines the dominance of top-down, scientific, and technical modes of analysis in decision-making structures for flood hazard mitigation. It explores the possibilities of incorporating more diverse and contextual knowledge—emphasizing social and cultural, as well as scientific and technical, dimensions—and creating more democratic forms of decision-making. The community-based mitigation underscored by the author involves the participation of people in the analysis of problems and the development of proposals. Examples from the United States, England, Bangladesh, and Portugal illustrate various approaches, successful and otherwise, to floodplain management.

Fordham, Maureen. (2000). Managing floods in a changing social environment. Paper presented at the *Floods and Flooding in a Changing Environment Conference*, Northampton, England, April 28-29, 2000.
Keywords:
England, socioeconomic impacts, awareness, flood disaster planning
Abstract: The author uses the Northampton (England) floods of Easter 1998 as a starting point for a discussion on the improvement of disaster management processes. In order to create sustainable, disaster-resilient communities, flood management must find a workable balance between technical expertise and social awareness. Specifically, the article makes the following recommendations: (1) ensure public awareness of flood risks is maintained in areas with existing structural flood defenses; (2) ensure emergency management procedures are also adequately addressed in areas with existing structural flood defenses; (3) ensure all social groups are adequately catered for, in all phases of disaster planning and management; (4) ensure emergency/disaster planning and management agencies maintain links with local communities; (5) ensure socially inclusive, participatory disaster planning and management are developed; and (6) ensure interagency liaison and communication procedures are working adequately.

French, R.H. (1992). Preferred directions of flow on alluvial fans. *Journal of Hydraulic Engineering*, 118(7), 1002-13.
Keywords:
hazard identification, modeling, alluvial fans
Abstract: This paper suggests modifications of the method used to delineate floodplains on active alluvial fans for the NFIP, given new data regarding the deviations of channels from the medial radial line at the apex of the fan. The original methodology assumes that every point on an alluvial fan contour had an equal probability of being impacted during a flood event (i.e., a uniform probability distribution was assumed). Data now available imply that a normal distribution better describes the probability of points on an alluvial fan contour being hit during a flood event. Results from an example of the application of the modified methodology are compared with the results obtained using the original methodology.

French, Steven P. and Raymond J. Burby. (1980). *Managing Flood Hazard Areas: The State of Practice*. Chapel Hill, NC: Center for Urban and Regional Studies, University of North Carolina.

Keywords:
floodplain management
Abstract: By 1979, many communities and regional agencies had become involved in floodplain management as a result of the NFIP, the Coastal Zone Management Program, numerous state programs, and the initiative of local citizens. This report describes current practices in floodplain management in these agencies. At the local level, low levels of public education among land developers and property owners were the largest obstacles to better land use management. Lack of state and federal financial support was the most serious obstacle for regional land use management in floodplains. However, state and federal agencies are significant providers of technical assistance to local and regional bodies. Eighty percent of local agencies reported that they had received technical assistance from the NFIP. The survey also includes data on how local communities judged the effectiveness of the program, highlighting encroachment on natural areas and exposure of existing development to flood damage as among the major problems faced. The data presented were derived mainly from two mail surveys conducted in 1979. The first survey was directed to a sample of local agencies involved in the NFIP. Members of the National Association of Regional Councils received the second survey.

Fridgen, Patrick M. and Steven D. Shultz. (1999). ***The Influence of the Threat of Flooding on Housing Values in Fargo, North Dakota, and Moorhead, Minnesota.*** **Fargo, ND: Department of Agricultural Economics, North Dakota State University.**
Keywords:
development, property values, Minnesota, economic modeling, North Dakota, hundred-year flood standard, housing markets
Abstract: This study uses the hedonic valuation method (HVM) to quantify the impact of the threat of flooding on housing values in Fargo, ND and Moorhead, MN. Prices of 3,783 Fargo-Moorhead homes sold between 1995 and 1998 were regressed against structural housing characteristics, neighborhood and environmental indicators, and three flood risk variables. Being located in the 100-year floodplain lowered the sale price of an average home by $8,900 and approximately 81 percent of the price depreciation was associated with required flood insurance premiums. After the extensive 1997 flood, homes in the 100-year floodplain were on average priced $10,241 less than similar homes located outside the floodplain were before the 1997 flood event. Publicity subsequent to the 1997 flood was responsible for average homes in the 100-year floodplain being reduced by an additional $1,350. In contrast, homes in the 500-year floodplain on average sold for $3,100 more than similar homes not in the floodplain. It was concluded that homebuyers in Fargo and Moorhead place a value on flooding risk, that more disclosure is needed regarding the location of the 500-year floodplain, and that substantial housing-related benefits are likely to be generated by various flood mitigation projects in the area that result in a redesignation and reduction of the 100-year floodplain.

Friends of the Earth. (1998). ***Flood Funding Fiasco: National Flood Insurance Program*****. Washington, DC: Friends of the Earth.**
Keywords:
Coastal Barrier Resources System, development, Florida, NFIP, environmental impacts
Abstract: This memorandum states that the NFIP has more than 3.8 million policies along the nation's coasts and rivers, with a potential liability of over $400 billion. This report argues that reforms to the NFIP enacted in 1994 have provided limited benefits. Furthermore, a provision

included in the 1996 Omnibus Parks bill exempted eight Florida beaches from CBRS. This provision allowed developers to obtain flood insurance (which can cover storm damage) for disaster-prone beachfront properties. Thus, the NFIP hurts both taxpayers and the environment by inducing development in floodplains.

Fukuoka, Shoji, ed. (1998). ***Floodplain Risk Management.*** **Proceedings of an International Workshop on Floodplain Risk Management, Hiroshima, Japan, November 11-13, 1996. Rotterdam, Netherlands: Balkema/Rotterdam/Brookfield.**
Keywords:
risk management, levees, disaster planning, flood control, risk communication
Abstract: This international workshop examined the risk management measures taken in the past to minimize loss of life and property damage in the event of large-scale flooding of a city by river or sea water, following partial or complete collapse of a levee. It was also intended to identify proper techniques and counter measures by discussing national and international risk management for floods in the context of actual cases of large-scale flooding in which the risk of flooding was minimized. The following topics were discussed in the workshop: floods (forecasts, analysis, and case studies); mechanisms of levee breach and design standards for levees; emergency management systems, including sharing roles by national and municipal governments; development of hazard maps and their usage; information release, evacuation, rescue, volunteer activities, and flood fighting; secondary damage; flood insurance and land acquisition; law suits against flood damage; use of floodplains and restrictions on their use; flood control without disturbing the natural environment; and basin-wide flood control and management. The papers fall into two categories: those written by senior engineers who have had responsibility for managing major floods in different countries and have experience in making decisions on mitigating flood risks and those written by researchers who investigate the management of floodplains.

Galloway, Gerald E., Jr. (1994). Floodplain management: A present and a 21st century imperative. ***Water Resources Update,*** **97(Autumn), 5-8.**
Keywords:
floodplain management, relocation, structural approaches, floodproofing
Abstract: As a result of the development of the floodplain, both for agricultural and recreational purposes, the nation faces three major problems: (a) people and property remain at risk, not only in the floodplains of major rivers, but also throughout many other areas in the nation; (b) many regions face severe ecological consequences due to the loss of habitat in riverine areas; and (c) the division of responsibilities for floodplain management among federal, state, tribal, and local governments lacks clear definition. This article summarizes the conclusions and recommendations from *Sharing the Challenge*, issued by the Interagency Floodplain Management Review Committee in 1994. The committee recommended supporting a strategy that avoids unnecessary human use of the floodplain, supports permanent evacuation of flood-prone areas, floodproofs structures remaining in the floodplain, creates additional natural and artificial storage, and provides adequately sized and maintained levees and other structures.

Galloway, Gerald E., Jr. (1995). New directions in floodplain management. ***Water Resources Bulletin,*** **31(3), 351-7.**
Keywords:

floodplain management, Midwest floods of 1993, public policy, economic impacts, socioeconomic impacts, environmental impacts, riverine areas

Abstract: Over the past 30 years, average annual riverine flood damages have exceed $2 billion. Damages associated with the Midwest floods of 1993 exceeded $12 billion and these costs do not include the nonquantifiable, human impacts of this disaster. In a report submitted to the White House in June 1994, a federal interagency floodplain management review committee proposed better ways to manage the nation's floodplains. The committee indicated that the 1993 flood was the result of a significant hydrometeorological event, that federal flood control efforts in the Mississippi basin had prevented nearly $20 billion in potential damages, and that, in spite of flood-damage reduction efforts, people and property remain at risk due to inevitable future flooding. The committee also recommended that the division of decision and cost-sharing responsibilities among federal, state, and local governments be more clearly defined and that the nation adopt a strategy of avoiding inappropriate use of the floodplain, minimizing vulnerability to damage through both nonstructural and structural means, and mitigating damages as they occur. The report did not call for abandonment of human use of the floodplain but argued for full consideration of the economic, social, and environmental costs and benefits of all future floodplain activity.

Gallup and Robinson, Inc. (1999). *Cover America: A Campaign Evaluation Report*. Pennington, NJ: FEMA.

Keywords:

marketing, risk communication, Cover America, NFIP

Abstract: In 1995, FIA contracted for the initiation and implementation of a nationwide marketing and advertising campaign called Cover America. The purposes of the program were to establish the importance and value of flood insurance in the minds of consumers, stimulate demand for flood insurance, and provide opportunities for other NFIP stakeholders to communicate with the market. The bulk of the 43-month program (May 1995 through December 1998) consisted of media advertising, direct mail, and public relations. This report summarizes the results of an independent review that FEMA requested on the effectiveness of the Cover America campaign. The report concludes that the campaign has successfully met its objectives. More specifically, the report states that Cover America has positively influenced consumers. It has increased awareness, changed attitudes, generated intermediate actions like information requests, and produced desired outcomes, including sales. Awareness of NFIP has also increased. Before the campaign, 52 percent of respondents said they had never heard of NFIP. Most recently, 43 percent of respondents said they had never heard of NFIP. However, the proportion of respondents who have never heard of FEMA has remained generally unchanged since the Cover America program was launched. Similarly, the positive image of NFIP has improved during the advertising period, from 18 to 30 percent, while the positive image of FEMA has stayed the same. Among those aware of NFIP, positive image has improved 16 percentage points and among those aware of FEMA, positive image has improved 8 percentage points.

Garner, Anna C. (1996). The cost of fighting Mother Nature: News coverage of the 1993 Midwest floods. *Journal of Communication Inquiry*, 20, 83-98.

Keywords:

Midwest floods of 1993, media, communication

Abstract: This article contrasts national and local press coverage between July 1 and August 31, 1993, of the "The Great Flood of 1993," exploring major themes used to explain the disaster and to describe the impact of flooding on the people of the Midwest. Coverage in *Time*, *Newsweek*, and *The New York Times* focused on depersonalized economic costs of the flood, framing the flood in political terms such as entitlement programs, while the regional *The Des Moines Register* focused on the flood's impact on individuals, families, and communities. The main theme of all the flood discourse was a fight with Mother Nature. Subthemes were (a) technological progress (especially in the national media), with a counter-theme of skepticism of technology; (b) national and personal cost, with a secondary theme of the cost to the taxpayer (the national media suggested that flood insurance is a federal bailout, while local media took a more positive approach); and (c) the politics of compassion (including the concern and support of elected officials and celebrities), which the national media regarded as undermining self-reliance. The author suggests that personal stories are important in covering disasters in that they help readers understand and relate to the event.

Geotrac. (1999). *Lender Compliance Flood Study*. Norwalk, OH: Geotrac.
Keywords:
mandatory purchase, North Dakota, insurance coverage
Abstract: This study determined that one-quarter to one-third of flood-damaged properties in Grand Forks, ND, required to have flood insurance did not have coverage. The outcome is significant in terms of the flood event and study timeframe because it follows the National Flood Insurance Reform Act (NFIRA) of 1994. NFIRA intended to strengthen the requirements for the mandatory purchase of flood insurance originally by the Flood Disaster Protection Act of 1973.

Gersen, Jacob Ezra. (2001). *Strategy and Cognition: Regulating Catastrophic Risk*. (Ph.D. dissertation, University of Chicago).
Keywords:
Midwest floods of 1993, Hurricane Andrew, natural disasters, risk assessment, risk management, disaster planning, socioeconomic impacts, cognitive psychology
Abstract: This project explores the political economy of catastrophic risk from natural disasters in the United States. Unlike previous work on disaster behavior, this dissertation highlights the importance of heterogeneous behaviors on the part of citizens. The project begins by surveying the dominant economic and psychological theories of individual choice about risk. Hypotheses about risk perception and decision-making are developed and quantitative analysis follows using data from disaster losses and hazard insurance. Findings indicate that individuals respond to risk exposure, use availability as a heuristic for evaluating risk, and tend to seek uncertainty with respect to disaster risk. A formal model of individual decision-making about risk management strategies is developed and psychologically realistic actors are introduced into the game. Using an informational cascade model, the analysis shows that communities facing similar objective risk exposure may respond in remarkably different ways. Allowing for biased actors in the game can either increase or decrease the probability that the group will adopt the optimal strategy, depending on the type and magnitude of the bias. Empirical testing of the cascade model relies on a regression equation and county-level data on risk management decisions, demographics, and natural hazard losses. Estimation proceeds using a mix of Maximum Likelihood (ML) and Markov Chain Monte Carlo (MCMC) methods, and the analysis offers preliminary support for the model. The project concludes by inquiring about the effect of citizen decision making on the

evolution of political institutions. Using both historical data and basic quantitative analysis, the project offers a positive account of the legislative framework for catastrophic risk regulation. The project highlights the importance and potential benefit of jointly analyzing cognitive bias and strategic environment.

Glick, Daniel. (1994). The flood insurance game. ***National Wildlife,*** **32, 44-5.**
Keywords:
NFIP, liability
Abstract: The author argues that the NFIP, which has three goals—to limit government spending on disaster relief, to curb development in floodplains, and to provide insurance to residents of flood hazard areas—has not succeeded. The author argues that development in floodplains continues, while participation in the flood insurance program remains poor. Furthermore the NFIP, according to the author, may be one of the biggest domestic liabilities, next to Social Security.

Goddard, James E. (1963). Floodplain management improves man's environment. ***Journal of the Waterways and Harbors Division,*** **3702(4), 67-84.**
Keywords:
mapping, Tennessee Valley Authority
Abstract: This report recommends mitigation of flood hazards through land-use and structural regulations. The report identifies the experiences of the Tennessee Valley Authority as an example of comprehensive planning for development of floodplains. Flood damage potential, tied to the rate of development, has outpaced the considerable spending for structural approaches to flood hazard mitigation. The study reports that $5 billion was spent between 1960 and 1963 to protect against floods and that an addition $10 billion would be needed to protect the remainder of the 2,000 cities subject to flood hazards. The experience of the Tennessee Valley Authority is particularly pertinent because of its exchanges of land use and flood damage data with local and state governments.

Godschalk, David R. (1984). ***Impacts of the Coastal Barrier Resources: A Pilot Study*****. Chapel Hill, NC: Department of City and Regional Planning, University of North Carolina.**
Keywords:
Coastal Barrier Resources System, North Carolina, Florida, legislation, development
Abstract: At the time of this study for the Department of Commerce, the Coastal Barrier Resources Act (CBRA) was two years old. The author sought to identify initial impacts of CBRA. He conducted two case studies, made inquiries directly to insurance and financial organizations, and sent a survey to authorities in three states. He says withdrawal of federal flood insurance from Topsail Island, NC, clearly deterred development, so much so that local developers tried unsuccessfully to sue to get their lands removed from the designation so they could regain access to flood insurance. Withholding federal funds for infrastructure was also having an effect. The author found that on Hutchinson Island, FL, local authorities placed a moratorium on new projects referred and denied several pending proposals when they found that federal help would not be forthcoming to improve the carrying capacity of bridges serving the barrier island. From his surveys, Godschalk predicts a range of possible effects of the CBRA's limitations, including increased development in already developed areas or a shift from reliance on federal insurance coverage. The most common response, however, was that the effects of

eliminating flood insurance and other federal assistance are not yet apparent, overall impacts have been either minor or neutral to date.

Godschalk, David R., David J. Brower, and Timothy Beatley. (1989). *Catastrophic Coastal Storms: Hazard Mitigation and Development Management*. Durham, NC: Duke University Press.
Keywords:
coastal areas, hurricanes, public policy, mitigation, Hurricane Camille, Hurricane Frederic, Hurricane Alicia
Abstract: This is a study of coastal storm hazards and related policies. The authors outline a strategy for overcoming obstacles to safeguarding people and property and conclude that federal policies encouraging development in vulnerable coastal hazard areas must stop. They advocate withholding disaster assistance and federal flood insurance from areas that have disregarded previous hazard-reduction requirements. The book discusses coastal storm risk as a policy problem; alternative approaches to mitigating coastal storm hazards; mitigation measures after hurricanes Camille, Frederic, and Alicia; federal and state mitigation programs and policies; local mitigation tools and techniques; mitigation practices in high-hazard coastal localities; and influences on mitigation priority, adoption, and effectiveness.

Godschalk, David R., Timothy Beatley, Philip Berke, David J. Brower, Edward J. Kaiser, Charles Bohl, and R. Matthew Goebel. (1999). *Natural Hazard Mitigation: Recasting Disaster Policy and Planning*. Washington, DC: Island Press.
Keywords:
Hazard Mitigation Grant Program, mitigation, Florida, Missouri, Iowa, California, Massachusetts, Tennessee, Hurricane Andrew, Midwest floods of 1993, Hurricane Bob
Abstract: This book begins by describing the importance of natural hazard mitigation and describing the history and evolution of mitigation and disaster assistance policy. Next, it describes in detail six natural disaster cases, including Florida after Hurricane Andrew, Missouri after the Midwest Floods of 1993, Iowa after the Midwest Floods of 1993, California after the Loma Prieta and Northridge earthquakes, Massachusetts after Hurricane Bob and other storms, and Tennessee after a series of floods and storms. The book also assesses the national mitigation system and FEMA's Hazard Mitigation Grant Program. Finally, it provides ethical guidelines for hazard mitigation and planning for sustainable communities.

Green, C.H., D.J. Parker, and S.M. Tunstall. (2000). *Assessment of Flood Control and Management Options*. Cape Town, South Africa: World Commission on Dams.
Keywords:
flood control, floodplain management, flood damage, dams, environmental impacts, socioeconomic impacts, economic impacts, strategic planning, risk communication
Abstract: This report discusses the management of floods and the identification of appropriate strategies for local conditions. It also analyzes the role of dams as part of a comprehensive approach to managing the risks posed by floods. The appropriateness of a particular strategy varies according to the nature of the flooding and to the presence of other conditions in the local environment. The approach recommended in the report is necessarily comparative: the only way to identify the role of dams in floodplain management is in the context of the appropriate roles of all other options. Moreover, the most appropriate local strategy will often consist of a

combination of measures, one of which may or may not involve a dam. A logical approach begins by analyzing the nature of flooding in an area, identifying available options, comparing these in terms of their contribution to the society's objectives, and finally selecting the best options. Discussion on identifying and overcoming potential barriers to sustainable floodplain management appears in the last chapter of the report.

Green, Robert H. (1999). ***Risk-Based Analysis for Flood Damage Reduction Studies Engineer Manual*****. Collingdale, PA: DIANE Publishing Company.**
Keywords:
risk assessment, Army Corps of Engineers, modeling
Abstract: This book describes and provides procedures for flood-damage reduction studies conducted by the Army Corps of Engineers. The guidance presented and procedures described in this manual apply to all elements including major subordinate commands, labs, and field operating activities having civil works responsibilities. The procedures described herein lead to estimation of expected benefits of proposed plans to reduce flood damages using risk and uncertainty analysis. Quantitative and qualitative methods of representing the likelihood and consequences of exceedance of the capacity of selected measures are also included.

Griffith, Charles T. (1994). The National Flood Insurance Program: Unattained purposes. ***William & Mary Law Review,*** **35(2), 727-65.**
Keywords:
NFIP, history
Abstract: This article discusses the development and history of the NFIP, presents problems, and suggests solutions. The author reviews the three stages of implementing the program at the local level. The article also poses problems of the NFIP in the context of the Disaster Relief Act and examines the effects of three cases, known as the trilogy cases, to the NFIP. The author concludes with a discussion of other existing measures being implemented to improve the NFIP.

Griffith, Rebecca Sue. (1994). ***The Impact of Mandatory Purchase Requirements for Flood Insurance on Real Estate Markets.*** **(Ph.D. dissertation, University of Texas at Arlington).**
Keywords:
Texas, mandatory purchase, lending institutions, economic modeling, property values, housing markets
Abstract: This study examines how enforcement of the mandatory purchase provisions affects the selling price of homes and the residential real estate market. The author obtained data from 4,686 home sales in Abilene, TX, between 1989 and 1992. Besides sale price, the dataset included sale date, size, age of house, percentage of high school graduates in neighborhood, flood frequency (10-, 25-, 50-, 100-, 200-, and 500-year frequencies), value of insurance premium, and whether the lending institution enforced the flood insurance purchase requirement. Of the 4,686 properties, 550 had flood insurance policies in effect in 1993. The author retained 3,724 sales in the dataset because the remainder had incomplete data. Sale prices ranged from $1,500 to $450,000 with a mean of $51,000, which suggests a heterogeneous housing market. The author fit both linear and log-linear hedonic price models to the dataset. Results show the log-linear models had a higher R-squared than the linear models. The author then ran three log-linear models in which the flood-related variables differed: 1) only a dummy variable of whether the house was in the 100-year floodplain, 2) flood frequency only, and 3) insurance premium

index and whether the lending institution enforced the mandatory purchase requirement. All of these variables had significant coefficients. Enforcement of the insurance purchase requirement had the highest coefficient indicating it has the strongest influence of the flood variables considered. The regressions confirmed the original hypotheses.

Grigg, Neil S. and Otto J. Helweg. (1975). State-of-the-art of estimating flood damage in urban areas. *Water Resources Bulletin*, 11(2), 379-91.
Keywords:
flood damage, economic impacts, urban areas
Abstract: Passage of the Flood Insurance Act of 1968 has prompted the consideration of local flood protection projects. Engineers and local agencies need consistent methods to estimate flood damage in order to perform feasibility studies. Federal agencies have a great deal of data and experience in making damage estimates, but no comprehensive guides are available at the local level. This article presents curves of flood damages for different types of residential structures. The relationships used by FIA are shown to be reasonable and are recommended for use as approximate guides.

Grimm, Mike. (1998). Floodplain management. *Civil Engineering*, 68(3), 63-9.
Keywords:
Colorado, floodplain management, mitigation
Abstract: The author describes how floodplain management efforts in Fort Collins, CO, reduced the loss of life and property damage after a massive flood struck the city on July 28, 1997. He discusses the background on the city's floodplain management program, the positive effects of pre-disaster mitigation, the adoption of a storm-water basin map, and the identification of floodplains in the city's Master Drainageway Plans.

Gruntfest, Eve. (1995). Long Term Social and Economic Impacts of Extreme Floods. Paper presented at the *United States-Italy Research Workshop on the Hydrometeorology, Impacts, and Management of Extreme Floods*. Perugia, Italy, November 13-17 1995.
Keywords:
economic impacts, socioeconomic impacts, Midwest floods of 1993, Pennsylvania, West Virginia, South Dakota, Colorado, California, North Dakota
Abstract: This paper states that social science research following disasters is limited and outdated: most of the few longitudinal studies are 25 years old. The paper summarizes the existing research efforts on these impacts and reviews the actual impacts from nine extreme events (including: 1889 and 1997 Johnstown, PA; 1972 Buffalo Creek, WV; 1972 Rapid City, SD; 1976 Big Thompson, CO; the Midwest floods of 1993; 1990 Yuba City, Linda, and Olivehurst, CA; and 1997 Grand Forks, ND). The paper also provides recommendations for future research. Some of the most difficult questions that need to be addressed are: (a) What time frame constitutes long term? (b) How can the social and economic effects of a flood be isolated from other local, regional, and national factors? (c) How can the negative effects of a flood on a neighborhood be evaluated when they may be overshadowed by prosperity at the community level? Finally, the author suggests that disaster prevention needs to address economic and political issues, not only geological and meteorological aspects. Consequently, the links between social and physical science need to be developed.

Gruntfest, Eve and Daniel Pollack. (1994). Warnings, mitigation, and litigation: Lessons for research from the 1993 floods. *Water Resources Update*, 95(Spring), 40-4.
Keywords:
communication, risk assessment, Missouri
Abstract: This article explores the relationship between warnings and litigation. It examines a case study in St. Louis to analyze where technological and scientific limits are reached and where legal liability begins. The authors make recommendations for future research concerning warnings. Four conclusions follow from their analysis: (a) forecasting accuracy is not precise; (b) natural and technological hazards are inextricably linked; (c) more precise forecasts and more confidence in the forecasts might have allowed the company studied (Phillips) to avoid the problems that ensued when its propane contaminated a river; and (d) the severity, frequency, and "fault line" of a flood are more predictable than other natural disasters and should be acknowledged. The article calls for research that addresses the links between technological and natural disasters, as well as the relationship between technological sophistication and forecasting accuracy.

Gruntfest, Eve and Marc Weber. (1998). Internet and emergency management: Prospects for the future. *International Journal of Mass Emergencies and Disasters*, 16(1), 55-72.
Keywords:
media, communication, risk communication
Abstract: This article reports on the growing value of Internet resources for the emergency management profession. The analysis has six components: (a) a brief history of the field prior to the introduction of the Internet; (b) an overview of the changes in emergency management since the introduction of the Internet and a summary of the characteristics of Internet communications; (c) some descriptions of how the Internet is currently used in flood, earthquake, and volcano research; (d) examples of Internet use as a tool for education; (e) federal and state employment of the Internet in emergency management during disasters and for public education and awareness between disasters; and (f) conclusions and suggestions for future research.

Grzeda, Stan. (1996). FEMA digital flood mapping program. *Earth Observation Magazine*, 5, 22-5.
Keywords:
hydrology and hydraulics, mapping, Special Flood Hazard Areas
Abstract: FEMA uses Flood Insurance Studies (FISs) to acquire flood risk data through hydrologic and hydraulic studies. Currently, FISs have been completed for virtually all of the 21,400 communities with flood risks. The results of each FIS are utilized by FEMA's Technical Evaluation Contractors to prepare FIRMs. These maps depict the spatial extent of Special Flood Hazard Areas (SFHAs), areas subject to inundation by the 100-year flood (>1 percent annual probability), and other thematic features. The FIRM provides the basis for the NFIP's activities related to floodplain management, mitigation, and insurance.

Haeuber, Richard A. and William K. Michner. (1998). Natural flood control. *Science and Technology Online*, 1998(Fall).
Keywords:
floodplain management, environmental protection, environmental impacts

Abstract: The authors point out that, although we understand all too well the damage floods do, we have not, until recently, understood well the many beneficial aspects of flooding. Floods are critical for maintaining and restoring many of the important services provided to humans by riparian ecosystems. It has become apparent that floods present us with a paradox: we want to prevent them because they threaten our lives and ways of life yet we find ourselves searching for ways to allow or even reintroduce flooding, because it supports the biological infrastructure that makes valued aspects of our lives possible. Thus flood control as it currently stands cannot be effective over the long term. Rather, the key is a new, more informed kind of flood management that works with instead of against the forces of nature.

Hamlin, M. (1994). Avoiding liabilities downstream. *Mortgage Banking*, 55, 111-26.
Keywords:
compliance, geographic information systems, mapping, liability, lending institutions, mandatory purchase
Abstract: New flood legislation not only exposes lenders to the risk of financial penalties for noncompliance but also now dramatically increases the risk of lawsuits by borrowers arising from inaccurate determinations. Thus, lenders must take the accuracy issue seriously. While there are many ways of determining whether a property is in a SFHA, accuracy can be improved by utilizing more specific sources for locating the property and by cross-checking data. Mapping determination processes range from strictly manual to fully automated. Three general categories of automated systems exist. First, the probability system assesses the probability that a given property is in a SFHA. Second, flood mapping systems that rely on GIS generally require two distinct layers of information: a flood map layer and a secondary source street map layer. Third, a process called digitizing converts paper FIRMs into digital flood maps for use on a computer. FEMA has begun to release some digital flood maps.

Hampson, Rick. (2000). So many people – And nowhere left to run. *USA Today*, July 25.
Keywords:
Florida, disaster planning, hurricanes
Abstract: The US coastline has become too crowded to evacuate everyone safely when disaster strikes. Evacuations must begin earlier, when there is still uncertainty about a storm's path (three-quarters of evacuations turn out to be unnecessary). A two-decade lull in hurricane activity may be ending, sea levels are rising, and a surprising number of people don't flee hurricanes. Lee County, FL, has considered several unconventional and controversial approaches: (a) public storm shelters (not endorsed by the American Red Cross) in areas that could be inundated by strong hurricanes; (b) refuges of last resort (which some believe encourage people not to evacuate); (c) growth controls; (d) review of new construction; and (e) storm-proof parking garages. Lee County is also trying to develop an "evacuation culture," in which the threat of disaster is taken seriously. This would involve an evacuation plan for each family, houses with "safe rooms" for sitting out weaker storms, and interstate highways with lanes that can be easily converted to move away from the storm. The article provides estimated evacuation times during peak tourist season for a Category 4 hurricane for 16 "problem areas." Times range from 20-29 hours in Myrtle Beach, SC, and Long Island, NY, to 50-60 hours in Ft. Myers, FL, and New Orleans, LA.

Hampson, Rick. (2000). Where nature is an immovable object. *USA Today*, July 25

Keywords:
development, erosion, Florida, coastal areas, environmental protection, disaster planning
Abstract: Sanibel Island, FL, is relatively undeveloped, as a wildlife preserve comprises about two thirds of the land mass. The causeway that connects the island with the mainland threatened the island with over-development, and the city voted to adopt a growth cap restricting the number of new housing units. In part, it was unsafe to have more people on the island than could be evacuated in an emergency. The city's image became synonymous with smart growth, a stringent building code, stringent zoning laws, conservation, and preservation. The city purchased land prone to erosion and replaced sand only after much debate. Residents want to save the coastal environment and see a problem with people who build too close to the beach.

Handmer, John. (2002). Are flood warnings futile? Risk communication in emergencies. *The Australasian Journal of Disaster and Trauma Studies,* 2.
Keywords:
risk communication, awareness, Australia
Abstract: Flood warnings often don't work well and too frequently fail completely – and this despite great effort by the responsible authorities. The reasons for this may be inherent in the methodology and definitions used to assess warnings, for example, higher standards may be applied to warnings than to other forms of risk communication, and the definition of failure will often determine the outcome of an evaluation. Aside from these methodological issues, warnings may fail for a range of reasons associated with the meshing of the warning message with those at risk; as well as institutional factors such as cooperation between the organizations involved, and how they conceptualize the warning task. The task may be conceptualized narrowly leaving out important elements of the risk. These factors are examined in the context of recent European and Australian research and experience of warnings. Despair is understandable; while resources devoted to warning systems are fairly static, the task is probably becoming more challenging by the day because of social evolution – and in turn this raises the issue of the validity of much earlier research. Although success with warnings may becoming more difficult to achieve, there are potential changes in the operating environment, which may force higher performance. Other conclusions include: the importance of developing consensus over the aim of warning systems; a more negotiated approach to those at risk (rather than a monopolistic supplier approach); and targeting to ensure that no identifiable group is missed.

Harrington, Scott E. (2000). Rethinking disaster policy. *Regulation,* 23(1), 40-6.
Keywords:
disaster assistance, risk management
Abstract: The author explores the conventional view of disaster policy, which suggests that government programs reduce dependence on "free" disaster assistance and promote efficient risk management by property owners and farmers. He draws three conclusions from his analysis. First, the narrow scope of private-sector disaster insurance reflects in large part the low demand for coverage. Demand is low in part due to the availability of disaster assistance, which substitutes for insurance. Federal tax policy reduces supply by substantially increasing insurers' costs of holding capital to cover large but infrequent losses. Second, government insurance programs fail to encourage efficient risk management because of subsidized rates and limited underwriting and risk classification. Third, the practice of subsidizing government insurance,

while giving disaster assistance to people who eschew coverage and to some people who have it, is more likely to raise taxpayers' costs than to reduce them.

Hayes, Thomas L. and Randall A. Jacobson. (2001). ***National Flood Insurance Program: Actuarial Rate Review*****. Washington, DC: FEMA.**
Keywords:
insurance premiums, subsidies
Abstract: This is the annual update of actuarial reviews, undertaken to maintain the NFIP's goal of a fiscally sound rating and coverage structure. The distribution of business written in 2002 is anticipated to be 29 percent at subsidized rates and 71 percent at full-risk premiums. The most recent changes went into effect on May 1, 2001, with an average rate increase of 3.2 percent for actuarially rated policies and 2.7 percent for subsidized policies.

Hazard Mitigation Technical Assistance Partnership, Inc. and French & Associates, Ltd. (1998). ***Handbook for Post-Flood Evaluation of CRS Activities*****. Washington, DC: FEMA.**
Keywords:
Community Rating System, floodplain management
Abstract: Since 1990, CRS has provided flood insurance premium discounts in recognition of local floodplain management programs that exceed the minimum requirements of the NFIP. The amount of the discount depends on the number and importance of activities a community implements and the sum of the individual scores for each activity. This handbook discusses the process of evaluating the effectiveness of CRS activities based on actual performance during flood events. The recommended evaluation process covers both those items needed to measure effectiveness in CRS terms and those non-NFIP or non-CRS benefits that floodplain management activities provide to a community.

Hazard Mitigation Technical Assistance Partnership, Inc. and French & Associates, Ltd. (1998). ***Review of the Impact of CRS Activities on Areas Impacted by Hurricanes Bertha and Fran in North Carolina*****. Washington, DC: FEMA.**
Keywords:
Community Rating System, Hurricane Fran, Hurricane Bertha, North Carolina, cost/benefit analysis, building codes
Abstract: For many in eastern North Carolina the combined effects of Hurricanes Bertha and Fran in 1996 set a new benchmark from which to measure future storms. FEMA commissioned this report in order to assess the benefits provided by selected mitigation activities implemented by communities and by CRS. The project aimed to put a dollar figure on the actual flood damage prevented by the mitigation activities in a real event, not theoretical calculations of benefits and costs. The project team reviewed nine CRS mitigation activities and elements in eleven communities that were hit by Hurricane Fran: six coastal and five inland. The team collected flood data and interviewed local officials. It estimated damage data and compared the data with available disaster assistance and claims payments from flood insurance. One conclusion (among several others) indicates that structures built with no flood protection standards suffered twice the damage as those built to NFIP standards, and four times the damage to those built to the newer state coastal construction standards.

Hazard Mitigation Technical Assistance Partnership, Inc. and French & Associates, Ltd. (2000). *Evaluation of CRS Credited Activities during Hurricane Floyd.* Washington, DC: FEMA.

Keywords:
Community Rating System, Hurricane Floyd, North Carolina, mitigation

Abstract: This report reviews the performance of several communities' activities as part of CRS during and after Hurricane Floyd in North Carolina in 1999. Using a combination of data collected in the field, data from flood insurance claims, and interviews with local officials and residents, this report evaluates the impact of several CRS activities and elements (e.g., public information activities, mapping and regulations, and flood damage reduction). The report finds that although residents of communities participating in CRS have a higher level of awareness of their exposure to a flood hazard, retain a higher level of flood insurance coverage, and implement more flood protection measures, these indicators cannot be statistically linked to public information programs undertaken at the local level. Also, the report estimates that the average savings from preserving flood-prone areas as open space ranged from $47,500 to $111,000 per acre. The report also finds that the acquisition and relocation of flood-prone buildings was more effective at reducing flood losses than any other approach and that CRS was the cause for starting or modifying some local activities. However, in many cases CRS was not the only cause and it was overshadowed by recent flooding and disaster assistance funds. Further, the report finds that CRS had a greater impact on activities that were inexpensive or could be implemented with current staff resources (e.g., public information and flood warning).

Higney, Francis. (1999). Lucky escape for insurers. *The Washington Post Magazine*, September 23, 12.

Keywords:
Hurricane Floyd, insurance industry

Abstract: Insurers may have fared relatively well in the wake of Hurricane Floyd, which swept along the eastern seaboard of the United States in September 1999, wreaking havoc in many states. Property damage caused by flooding is expected to reach $2.5 billion but insured damages may only be in the area of $0.5 billion as most policies exclude flood damage, according to the Insurance Information Institute. A large part of insurers' liability will be for damages to vehicles covered by comprehensive policies. Allstate and Nationwide said they had each received around 10,000 claims. State Farm said it had received over 26,000 but expected this number to rise as flood waters subside. This latest catastrophe has thrown the viability of the catastrophe bond market, used by some insurers as an alternative to reinsurance, into stark relief.

H. John Heinz III Center for Science, Economics, and the Environment. (2000). *Evaluation of Erosion Hazards*. Washington, DC: FEMA.

Summary available at: http://www.fema.gov/mit/tsd/hz_erosn.pdf

Keywords:
erosion, insurance premiums, coastal areas

Abstract: This study concludes that, despite facing higher risk, homeowners in erosion-prone areas currently are paying the same amount for flood insurance as are policyholders in nonerosion areas. The study suggests that FEMA incorporate the risk of erosion into the cost of insurance along the coasts. Otherwise, other NFIP policyholders will have to subsidize what is likely to become a substantial cost.

H. John Heinz III Center for Science, Economics, and the Environment. (2000). *The Hidden Costs of Coastal Hazards: Implications for Risk Assessment and Mitigation*. Washington, DC: Center for Science, Economics and the Environment, Island Press.
Keywords:
coastal areas, mitigation, risk assessment
Abstract: This book addresses the need for a broader understanding of the categories and extent of the costs of coastal hazards. It makes specific recommendations for the improvement of the estimation and reporting of the cost of coastal hazards, for the improvement of risk and vulnerability assessment, and for the development and evaluation of mitigation strategies. The recommendations for improvement in these areas demand efforts at the federal, state, and local levels, and they focus on expanding the conceptual framework—previously limited to economic considerations—to include social, business, and environmental costs. In addition to these recommendations, the report proposes a framework for community planning. This framework is organized around three principles: (a) the importance of developing a broad set of alternative mitigation and preparedness strategies, recognizing the relevance of the status quo but not being restricted by current policy; (b) the importance of characterizing the potential losses from disasters of different magnitudes by linking risk assessment with a region's vulnerability; and (c) the need to incorporate a broad range of economic, business, social, and environmental costs (both immediate and over time) associated with weather-related hazard events when evaluating alternative mitigation and preparedness strategies.

Holway, James M. and Raymond J. Burby. (1990). The effects of floodplain development controls on residential land values. *Land Economics*, 66(3), 259-71.
Keywords:
development, building codes, floodplain management, economic modeling, zoning, property values
Abstract: This paper considers the effect of floodplain management programs on the market for vacant residential land. The authors model the developers' profits from housing production to illustrate the expected effects of parcel characteristics on land value. The hedonic method is utilized to analyze data on vacant floodplain parcels from nine communities that vary by type of flooding, regulatory programs, and geographic location. The authors' results show that zoning floodplains for lower density development, implementing building regulations requiring elevation above the level of the flood, and providing clear local leadership of programs each contribute to the lowering of land values in the floodplain.

Holway, James M. and Raymond J. Burby. (1993). Reducing flood losses through local planning and land use controls. *Journal of the American Planning Association*, 59(2), 205-16.
Keywords:
Base Flood Elevation, mitigation, floodplain management
Abstract: The NFIP emphasizes building elevation requirements to protect property from flood damage and to limit continued increases in flood losses. Economists believe that the cost to elevate buildings will shift some development to locations not prone to flooding. This article provides evidence that elevating buildings to NFIP standards does indeed reduce losses, but that adding additional elevation requirements will have little effect on the rate of increase in

floodplain development. Instead, these requirements must be supplemented by regulating the use of land within floodplains.

Houck, Oliver A. (1985). Rising water: The National Flood Insurance Program and Louisiana. *Tulane Law Review,* 60, 61-165.
Keywords:
enforcement, Louisiana, NFIP, legal issues and litigation, liability
Abstract: This article discusses the evolution and operation of the NFIP and Louisiana's stake in the program's success. Louisiana is a major participant in the NFIP, representing almost 12 percent of all policies in 260 participating communities. Research on the execution of the program in a number of specific inland and coastal Louisiana regions and communities illustrates both successes and problems in its implementation. The author notes that federal disaster relief payments might be lower if participation in the NFIP were required in high-risk areas. The article also considers the emerging problem of enforcement and the extent to which floodplain ordinances give rise to duties and liabilities. In *United States* v. *Parish of St. Bernard*, the United States sued for violations of obligations and ordinances under the NFIP. The impact of this case will determine whether litigation could become an enforcement tool. The article also examines the question of what the federal government can do to recover its losses. Recommendations for making the NFIP economically and politically viable include actions at the congressional level, such as structuring water project construction and disaster relief to aid rather than frustrate the NFIP; examining other federal assistance and disaster relief benefits to flood-prone areas; and mandating a study of the degree to which upstream levees and channelization affect water downstream. Other recommendations involve improvements available to FEMA and local authorities within the NFIP, suggestions for structural elevation and storm-proofing requirements for insurance eligibility, and suggestions for strengthening FEMA's resources.

Hovey, S.T., C. Daniel, and P.E. Bryant. (1998). *Complementing Remote Sensing Systems in Flood Mitigation and Preparation*. Fort Belvoir, VA: Army Topographic Engineering Center.
Keywords:
mapping, mitigation, disaster planning, Project Impact
Abstract: As a result of FEMA's response to the many natural disasters of the 1990s, Congress directed FEMA to make mitigation of impacts from future natural hazards its highest priority in working with state and local governments. The NFIP, and its related flood-risk studies and flood hazard mapping activities, are increasingly important functions to support mitigation. Current initiatives include modernizing flood hazard maps, lowering the cost of producing maps, and increasing the accuracy of mapping products. Emphasis of support to local areas is demonstrated by Project Impact, which seeks to mitigate disasters' impacts by taking preventive actions.

Howard, JoAnn. (1999). National flood insurance compliance. *Credit Union Magazine,* 65, 43-4.
Keywords:
mandatory purchase, lending institutions
Abstract: The Federal Insurance Administrator explains that mandatory purchase provisions of the National Flood Insurance Reform Act (NFIRA) of 1994 require owners of all structures located in SFHAs of communities participating in the NFIP to purchase and maintain flood

insurance as a condition of receiving a federally related mortgage or home equity loan on that structure. Although policyholder growth has increased markedly since the effective date of the joint final rule, a considerable gap remains between the number of households that the program insures in hazard areas and the number at risk. By following the correct procedures to determine whether the structure to be refinanced is in a SFHA as shown on a FIRM, lenders will comply with the law. The basic approach to complying with flood insurance requirements for all mortgage-related personnel in any lending institution has four steps. First, understand the flood peril. It can and does flood throughout the United States and its territories, especially in SFHAs but also in non-hazard areas. Many lending institutions have outsourced the responsibility of performing flood zone determinations to a flood zone determination company. Second, know all the compliance issues. The Act and its accompanying regulations cite compliance provisions in the areas of coverage, escrow, force placement, determination fees, use and retention of required forms, dispute resolution, and proper notification procedures. Third, focus on retention. Have a process in place to monitor renewals; keep service information up-to-date on all policies so that expiration notices get to the proper entities; develop a diary system to verify that each policy does renew. Fourth, be a risk manager. Manage flood insurance issues beyond their compliance minimums and treat it similarly to all other risk-related issues in the loan process.

Hudgens, D. (1999). Adapting the National Flood Insurance Program to relative sea level rise. *Coastal Management,* 27(4), 367-75.
Keywords:
coastal areas, floodplain management, mitigation, sea-level rise, hundred-year flood standard
Abstract: Congress created the NFIP to provide much-needed flood insurance to property owners and to decrease the nation's susceptibility to flooding. Relative sea-level rise now poses a threat to the nation's flood preparedness, with coastal property owners facing increasingly severe flooding. FEMA could address this vulnerability in several ways. By recalculating and extending the 100-year floodplains to incorporate estimates of relative sea-level rise, the program would prepare coastal property owners for the near-future flood risks. Further adaptation approaches to improve the NFIP include requiring floodproofing, obtaining "rolling easements," and conducting education campaigns.

Hughes, Rebecca Quinn. (1990). Bailing out the victims: A look at federal programs affecting coastal development. In *Focus on Maryland's Forgotten Bays: Report on the Conference on the Outer Coastal Bays*, May 5, 84-6, 92-101.
Keywords:
development, North Carolina, coastal areas
Abstract: In her capacity as legislative officer for the Association of State Floodplain Managers, Inc. and the Maryland Department of Natural Resources, Water Resources Administration, Hughes takes exception with the assumption that the NFIP represents a major factor in coastal development. She notes that much of the development occurred before the NFIP was established. Indeed, state coastal zone managers told the Congressional Research Service in 1988 that they could not document how the NFIP affects patterns of coastal development and the value of coastal property. She cites the example of Topsail Beach, NC, where privately funded infrastructure has led to development.

Hunt, Constance E. (1994). Improving the effectiveness of flood damage reduction policies through an integrated approach to watershed management. *Water Resources Update,* 97(Autumn), 21-4.

Keywords:
floodplain management, strategic planning

Abstract: The coordinator of the Coalition to Restore Aquatic Ecosystems (CRAE) highlights four findings from *Sharing the Challenge* with respect to floodplain management: (a) integration of multiple objectives; (b) interagency coordination; (c) local control; and (d) coordination mechanisms. Within CRAE, there exists general consensus that strategies to reduce flood damage should be integrated with strategies for achieving other objectives. Communities should take the lead in the development and implementation of these strategies for their subbasins while considering information on the relationship between their subbasins and the rest of the watershed. State and federal agencies should work at a regional level to develop the larger watershed context in which these strategies will operate, and provide data and technical and financial support to these local efforts. This well-integrated framework for making decisions on water resource management can realize economic and environmental objectives on a sustainable basis and cut the costs of flood control.

Institute for Business and Home Safety. (1999). *Flood Insurance and the 1997 Flood in Grand Forks, North Dakota: Homeowner Survey Results.* IBHS Technical Report Series #1, Institute for Business and Home Safety (IHBS). Boston, MA: Institute for Business and Home Safety.

Keywords:
risk communication, North Dakota, Red River, awareness, risk perception, insurance purchase decision

Abstract: In 1997, devastating floods along the Red River of the North in North Dakota affected over 90 percent of the 50,000 residents in Grand Forks. Only 20 percent of damaged homes were covered by flood insurance, leaving taxpayers and victims to shoulder most of the costs of recovery. In an effort to improve awareness of the need for disaster protection, the "Grand Forks Flood Insurance Summit" was held, bringing together federal, state, and local government officials with the insurance industry. In preparation for the summit, IBHS and the University of North Dakota's Bureau of Governmental Affairs conducted a survey of Grand Forks homeowners to determine which factors influenced their decision to purchase or not purchase flood insurance. Results indicate that most homeowners simply believed they were not at risk from flooding. This report also describes actions taken since the flood and provides recommendations to the insurance industry and government to improve flood awareness and the purchase and retention of flood insurance.

Insurance Institute for Property Loss Reduction. (1995). *Homes and Hurricanes: Public Opinion Concerning Various Issues Relating to Home Builders, Building Codes and Damage Mitigation*. Boston, MA: Insurance Institute for Property Loss Reduction.

Keywords:
building codes, mitigation, attitudes, insurance industry, hurricanes

Abstract: This report describes the results of a study designed to obtain information from Atlantic and Gulf coastal residents concerning their opinions about various issues related to building codes in geographic areas subject to damage from hurricanes and other strong storms.

During July 1994, telephone interviews were completed with residents located in six coastal areas—Corpus Christi, TX; Biloxi, MS; Myrtle Beach, SC; and Tampa, Miami, and Jacksonville, FL. The final number of completed interviews totaled 1,241. More than nine out of every ten respondents (93 percent) indicated that they felt it was very important that homebuilders in their locale be required to follow building codes. Over one-third of residents (37 percent) indicated that they had made improvements to their residences in order to reduce the amount of damage that might occur as a result of another hurricane; 62 percent said they had not. Most respondents (85 percent) indicated that it was very important that local building departments conduct inspections of new residential construction. Finally, seven out of every ten residents (71 percent) indicated that they felt insurance companies should have a role in trying to reduce hurricane-related property losses; 22 percent felt they should not. The responses given most often as to what insurers should do included: inspect buildings to ensure that they meet existing codes before insuring, offer rebates or discounts for homes that meet the codes, work with buildings to ensure homes are built to code, and lobby for stricter building codes.

Insurance Legislator's Foundation. (2002). *Rising Water, Mounting Challenge: Flood Prevention, Protection and Assistance – A Legislator's Guide to Flood Insurance*. Albany, NY: Insurance Legislator's Foundation.
Keywords:
NFIP, public policy
Abstract: This comprehensive guide provides information to state legislators and staff on the NFIP and ways in which state legislators can improve awareness of flood risks and flood insurance protection, promote sound floodplain management, and assist victims of flooding disasters. Chapter topics in the guide range from the availability of flood insurance to the role of states in the NFIP to the mapping of floodplains. Appendices provide statistics on the NFIP, samples of flood insurance-related communications from states, and key contacts.

Insurance Research Council. (1986). *Catastrophic Losses: How the Insurance System Would Handle Two $7 Billion Hurricanes*. Malvern, PA: Insurance Research Council.
Keywords:
hurricanes, economic modeling, liability
Abstract: This study starts with two hypothetical hurricanes causing $7 billion each in insured property losses and tracks those losses through the insurance system to find out where they would fall. It also analyzes the financial impact two such losses would have on primary companies and reinsurers, as a group, in the United States and abroad. The study collected information on actual hurricane losses for 1983 and 1985, resulting in a substantial upward revision of earlier loss estimates for those storms.

Insurance Research Council. (1990). *The National Flood Insurance Program: Agency and Insurer Perspectives.* Oak Brook, IL: Insurance Research Council.
Keywords:
Write Your Own Program, insurance industry, insurance agents, insurance purchase decision, mandatory purchase, marketing
Abstract: The Insurance Research Council (IRC) conducted a series of surveys to review the organization, operation, challenges, and achievements of the NFIP and WYO from the perspectives of insurance companies and insurance agents in 1989. One of the purposes of this

research was to examine whether WYO and the NFIP are structured to maintain and increase the involvement of insurers and agents in selling flood insurance. Of equal concern was the issue of whether the flood programs are designed to attract and enable property owners who need flood coverage to buy it. A total of 104 insurers responded to surveys on WYO and the NFIP. Participating insurers represented 63 percent of 1988 total industry volume for property insurance premium. Four hundred and seventy-eight insurance agencies doing business in the 11 largest states for flood insurance policies completed the flood insurance surveys. A major finding from the surveys revealed agreement among insurers, agents, government officials, environmental, floodplain, and land-use organizations that mortgage lenders hold one of the keys to better compliance with the requirement for mandatory purchase of flood insurance. The surveys also found that 88 percent of both agents and insurers expressed some agreement with the statement that a more extensive public campaign to raise awareness about flood hazards and the availability of insurance would be effective in increasing the number of policies. The report provides discussion on additional findings from the surveys.

Insurance Research Council. (1995). ***Coastal Exposure and Community Protection: Hurricane Andrew's Legacy*****. Wheaton, IL: Insurance Research Council.**
Keywords:
Hurricane Andrew, insurance industry, insurance coverage, insurance claims, coastal areas, building codes, compliance, mitigation, enforcement
Abstract: This report by the Insurance Institute for Property Loss Reduction (IIPLR) and the Insurance Research Council (IRC) examines problems raised by destructive hurricanes with respect to the growing concentrations of people and property in high-risk coastal areas. It also discusses the urgent need to provide better protection for people, buildings, and communities through more rigorous construction standards and better enforcement of building codes, flood insurance requirements, and land-use regulation in areas subject to hurricanes. The study provides current data on insured coastal exposures and coastal populations in the United States by state and county. It also includes estimates of potential losses from severe hurricanes at vulnerable points along the Gulf and Atlantic Coasts, underscoring the magnitude and rapid growth of coastal exposures. For example, Hurricane Andrew caused $15.5 billion in insured losses, exceeding previous understanding about the maximum damage a single hurricane could cause. Finally, the report discusses steps that coastal areas at risk can take to lessen the damage and prepare for the next catastrophic event. Market forces, consumer tastes, training and education in the construction industry, and the insurance industry could all serve to encourage coastal communities to improve and enforce building regulations.

Insurance Research Council. (1999). ***Public Attitude Monitor 1999, Issue 1*****. Malvern, PA: Insurance Research Council.**
Keywords:
attitudes, risk perception, insurance coverage, natural disasters, building codes, disaster planning, disaster assistance
Abstract: This first issue of the Insurance Research Council's (IRC) *Public Attitude Monitor 1999* (PAM) report examines public attitudes toward coping with the property damage caused by natural disasters. Recent disasters have caused unprecedented levels of property damages and insurance claims payments. Disasters events such Hurricane Andrew in 1992 and the Northridge earthquake in 1994 have served to increase public awareness of the threats posed by natural

disasters. According to a survey by IRC, six in ten Americans believe that a natural disaster will occur in their community in the next 10 years. Most homeowners (88 percent) said they have purchased a standard homeowners insurance policy to address the risk of loss from natural disasters, but few have purchased any supplementary coverage. For example, only 6 percent of homeowners said they have purchased a government-subsidized insurance policy such as flood insurance. More than a quarter of all respondents said they are primarily relying on disaster relief to help them recover from a natural disaster. Although the public strongly supports the federal disaster relief programs, seven of ten would prefer that homeowners in areas with a high risk of natural disasters be required to purchase private insurance. Finally, eight of ten respondents supported requiring new homes to be built to withstand damage in the event of a natural disaster. Nearly seven in ten said they would willingly spend 6 percent or more on a new home built to withstand a natural disaster. The survey consisted of face-to-face interviews with 1,972 men and women 18 years of age and over.

Insurance Research Council. (2003). ***Public Attitude Monitor 2003, Issue 1.*** **Malvern, PA: Insurance Research Council.**

Keywords:
attitudes, risk perception, insurance coverage, natural disasters, building codes, flood disaster planning

Abstract: According to a survey by the Insurance Research Council (IRC), 72 percent of homeowners believe that state and local requirements that new homes be built to withstand damage from natural disasters are an excellent or a good idea. Sixty-two percent say they would be very or somewhat willing to pay an additional 6 percent for a new home to meet the requirements. The report shows that support for building codes transcends geographic regions but is especially strong in the South, which historically has been vulnerable to hurricane damage. Among homeowners in the South, four of five people say that building codes are an excellent or a good idea, and over 68 percent maintain their support even when the codes add 6 percent to a new home's cost. Even when not legally required, many homeowners have taken steps to protect their home from common household perils such as flooding caused by rain or snow (64 percent). For every peril, the percentage of homeowners who have taken steps to protect their home increases with household income. The survey also found that 95 percent of homeowners carry a homeowners or condominium owners' insurance policy. Approximately 22 percent have purchased additional water back-up and flood coverage (20 percent). Homeowners who believe that a natural disaster will damage homes in their area are more likely than homeowners who do not believe they are in a disaster-prone area to purchase coverage for floods (31 percent). The survey consisted of telephone interviews with 1,000 male and female adults 18 years or age or older. The sample was screened to include homeowners only, and participants were selected to be representative of the population of the continental United States.

Interagency Floodplain Management Review Committee. (1994). ***Sharing the Challenge: Floodplain Management into the 21st Century*****. Washington, DC: Government Printing Office.**

Keywords:
Midwest floods of 1993, mitigation, public policy

Abstract: In January 1994 the Clinton Administration's Floodplain Management Task Force assigned the Interagency Floodplain Management Review Committee (the Committee). Its

mission was to delineate the major causes and consequences of the Midwest floods of 1993 and to evaluate the performance of existing floodplain management and related watershed management programs. The Committee was also asked to make recommendations to the Task Force on changes in current policies, programs, and activities of the federal government that most effectively would achieve risk reduction, economic efficiency, and environmental enhancement in the floodplain and related watersheds. This is the final report of the Committee. The thesis of the report is straightforward: floods will continue to occur. The goals for floodplain management are clear. The means to carry out effective floodplain management exist today but need improvement and refocusing. The report concludes that the United States has lacked the focus and the incentive to engage itself seriously in floodplain management. The 1993 flood managed to focus attention on the floodplain and provided the incentive for action. The Committee proposes "a better way" to manage the floodplains. It begins by recognizing that all levels of government, all businesses, and all citizens have a stake in properly managing the floodplain. The Committee supports a floodplain management strategy of avoiding inappropriate use of the floodplain, minimizing vulnerability to damage through both structural and nonstructural means, and mitigating flood damages when they do occur. To ensure a long-term, nationwide approach to floodplain management, the Committee proposes legislation to develop and fund a national program to manage floodplains with principal responsibility and accountability at the state level. It also proposes revitalization of the Water Resources Council to better coordinate federal activities, limited restoration of some basin commissions for basin-wide planning, and issuance of a presidential executive order requiring federal agencies to follow floodplain management principles in the execution of their programs.

International Joint Commission. (2000). *Living with the Red*. Ottawa, ON, and Washington, DC: International Joint Commission.
Keywords:
Red River, floodplain management, mitigation, public policy
Abstract: After the Red River Basin flood of 1997, the governments of the United States and Canada asked the International Joint Commission (IJC) to analyze the root causes of the flood and to make recommendations as to how damage from major Red River floods could be mitigated in the future. This final report endorses most of the International Red River Basin Task Force's conclusions and recommendations, modifies some, and adds some new conclusions and recommendations of its own. For example, the IJC makes the following recommendation: to reduce vulnerability to flooding, all possible approaches, including both structural and nonstructural damage reduction measures, must be considered as part of a comprehensive plan. This would include, when environmentally, economically, and socially justified, development of additional reservoir storage, restoration of wetlands, microstorage, construction or improvement of levees and dikes, floodwalls and bypass channels, permanent evacuation of high-risk areas, flood-proofing, and the enhancement of flood forecasting and warning systems.

International Red River Basin Task Force. (2000). *The Next Flood: Getting Prepared*. Ottawa, ON, and Washington, DC: International Joint Commission.
Keywords:
Red River, floodplain management, mitigation, public policy
Abstract: The International Joint Commission asked the International Red River Basin Task Force to investigate the causes and effects of the disastrous Red River Basin flooding of 1997

and to recommend ways to reduce the impact of major floods. This report summarizes the proposals of the Task Force, which range from stricter building standards in SFHAs to improved interagency coordination of flood management responsibilities. The following recommendations provide a sample of those presented: (Recommendation 3) communities in the United States portion of the Red River Basin should ensure that community-built flood damage reduction projects are certified by FEMA for 100-year or greater protection, or should participate in the Non-Federal Flood Control Works Inspection Program; (Recommendation 15) the 500-year flood (0.2 percent flood) should be defined throughout the Red River Basin and used to inform the public of the potential risks of flooding from rare events, including the need to buy flood insurance in the United States, and as the basis of regulations for siting and floodproofing critical facilities; and (Recommendation 19) state, provincial, and other appropriate authorities should review the effectiveness of and compliance with the floodplain management regulations in the Basin and take steps as needed to improve enforcement. Many of the topics addressed by this report parallel those addressed by the evaluation of the NFIP.

Jacob, Klaus H. (2000). Futuristic hazard and risk assessment: How do we learn to look ahead? *Natural Hazards Observer*, 24, 2-5.
Keywords:
mapping, modeling, risk assessment
Abstract: Quantitative, probabilistic hazard assessment is generally based on the record of past hazardous events and used to account for present and near future hazards. However, the catalog of hazardous events is not always the only input to the assessment. Sometimes, generalized models, based on the historic record that account for the physical processes in the region, are used. To be maximally effective, the latest scientific knowledge must be applied when estimating future hazards and risks. Take, for instance, NFIP maps. For most localities, flood zones were mapped many decades ago. Land use patterns have since drastically changed in many of the most rapidly developing regions of the United States, altering the ability of the land to absorb high amounts of precipitation and to extend the duration of runoff in rivers and floodplains. Flooding beyond designated flood zones appears to be increasing, although systematic surveys to confirm this notion are generally lacking. Hence, flood-zone mapping does not depict the present state of the hazard, nor has the evaluation of other increasing risk exposures threatening many parts of the United States occurred.

Jensen, Ric. (1990). Finding answers to flooding woes: Federal policies, unsound development, and reservoir operations all contribute to flood problems. *Texas Water Resources*, 16(Fall), 1-12.
Keywords:
dams, development, flood control, modeling, Texas, structural approaches, nonstructural approaches
Abstract: This article asks the reader if building flood control dams and other structures are the best way to reduce flood damages. Structural measures like large dams provide a false sense of security that makes people feel they are safe from flooding. Structural measures are also expensive and can result in catastrophic losses if they fail. By contrast, nonstructural alternatives include managing existing dams to mitigate floods during emergencies, preventing construction in low-lying areas, lessening the impacts of urbanization, and increasing the effectiveness of flood insurance and floodplain management. The author summarizes efforts to alleviate flood

risks posed by the upper Trinity River in North Central Texas. Studies are underway to assess the impact of floods based on the amount of development allowed in low-lying areas. Local officials are regulating development in the region's floodplains by establishing uniform criteria. The US Geological Survey is working with state agencies to improve models to simulate flows in the Trinity River basin and to identify high-risk areas. Further south, Harris County has started to build computer models to provide a better idea of how many homes and businesses have been built in low-lying areas.

Johnson, A.A. (1990). Improvements to mapping of alluvial fan flooding. In *Hydraulics/ Hydrology of Arid Lands (H2AL)*. New York, NY: American Society of Civil Engineers.
Keywords:
mapping, modeling, alluvial fans
Abstract: FEMA is working to refine its assistance to engineers and floodplain managers by issuing revised and simplified guidance and modeling to mapping regulated floodplains subject to alluvial fan flooding. FEMA has also developed and released a model to be used on a personal computer that is intended to simplify the application of FEMA's alluvial fan flooding methodology. The timeliness and accuracy of mapping or remapping the flood risk for alluvial fan flooding sources shown as SFHAs on FIRMs have improved and will continue to improve. FEMA has taken steps in FY 1990 to improve the quality of the draft flood insurance studies by revising the study guidelines and by releasing a PC version of the alluvial fan model. In FY 1991, FEMA plans to work to revise the guidance and regulations to define more clearly the documentation that would demonstrate that the protection provided by natural or structural flood-control measures warrants removing areas from SFHAs with alluvial fans.

Jones, E. and W. Stolzenburg. (1988). Building in the coastal barrier resources system. Paper Presented on behalf of the National Wildlife Federation to the *Coastal Zone 1989 Conference,* July 13, 1988, Charleston, SC. Washington, DC: National Wildlife Federation.
Keywords:
Coastal Barrier Resources System, development, legislation
Abstract: The National Association of Realtors cited this study during a hearing held by the Senate Committee on Environmental and Public Works on S. 2729, which proposed amendments to the Coastal Barrier Resources Act (CBRA) of 1982. A copy of the paper is no longer available, therefore, the summary provided here represents the assessment of the realtors and should be viewed in that light. This paper assesses development on coastal barriers between 1982 and 1988. Jones and Stolzenburg examined aerial photographs of coastal barriers concluding that the number of structures in these areas increased 40.7 percent. Half of the development occurred in Florida. Although one of the purposes of CBRA was to discourage development by denying the availability of flood insurance and federal financial assistance, the study finds that the prohibition of flood insurance in these areas did not preclude development.

Kaiser, Edward J., Raymond J. Burby, Scott A. Bollens, and James M. Holway. (1987). Private sector land market decision agents as targets of floodplain policy. *International Journal of Mass Emergencies and Disasters,* 5(3), 311-35.
Keywords:
public policy, floodplain management, development, awareness

Abstract: This article examines the influence of floodplain land-use policy on land market decisions of three private-sector decision makers: owners of vacant land, developers, and building owners. It is based on a mail survey of 312 such decision makers in ten cities across the United States. The findings imply that effective floodplain programs must target builders and developers and owners of vacant land because their decisions come earlier in the rural-to-urban land conversion process and they are more likely to avoid the hazard or take mitigation actions in response to information, incentives, and regulations. Nevertheless, policy should also target the consumer, emphasizing insurance and awareness of the risks of flood damage, something that current policy does not do adequately.

Karlinger, M.R. and E.D. Attanasi. (1980). Flood risks and the willingness to purchase flood insurance. *Water Resources Research*, 16(4), 617-22.
Keywords:
insurance purchase decision, economic modeling
Abstract: Computer simulation experiments were conducted to determine the effects of alternative sources of uncertainty on the willingness to pay for flood insurance. Two alternative insurance protection schemes were investigated: coinsurance and fixed coverage. The question investigated here is to what extent the insurance scheme influences how purchasers respond to flood risks. Floods were assumed to be the log of a normal distribution and the effects of uncertainties in the parameters of this distribution on the purchase of insurance were explored using response surface analysis. Results indicate that fixed coverage insurance provisions shift most of the uncertainty in the physical parameters governing natural disaster occurrences away from the insured and onto the insurer. The results also show that the form of the damage function has little effect on the demand for flood insurance.

Karlsson, Per-Ola and Vacov Y. Haimes. (1989). Risk assessment of extreme events: Application. *Journal of Water Resources Planning and Management*, 115(3), 299-320.
Keywords:
dams, risk assessment, modeling, hydrology and hydraulics
Abstract: The safety of many existing dams could be improved by modifying them structurally in accordance with recent advances in statistical hydrology and improved availability of meteorological and hydrological data. Any increase in safety that might be gained by structural changes must be balanced against their costs. The risk analysis methodology known as the partitioned multiobjective risk method (PMRM) is explored in this paper through a dam-safety problem. The PMRM is well suited to the task of solving the probabilistic optimization problem posed by such risk-versus-cost considerations. With the PMRM, a number of conditional expected-damage functions are generated. Of these, one that represents events of a more extreme and catastrophic character is of particular interest. The close relationship that exists between the expectation of damage and the statistics of extremes is shown to simplify the implementation of the PMRM, and the relationship also permits the derivation of closed-forin equations that determine (for any partitioning of the probability axis) the expected damage, given that a flood with a return period that equals or exceeds n years occurs. Finally, an analysis is made as to how the choice of the distribution function representing the annual flood peaks might affect the conditional expectations.

Keeney, Dennis R. and Robert H. Alexander. (1994). Droughts, floods, and sustainability. *Water Resources Update*, 95(Spring), 15-20.
Keywords:
Iowa, Midwest floods of 1993, floodplain management
Abstract: This article views the catastrophic rainfall and flooding in the Midwest in the larger context of regional sustainability. Converging strategies from different sources suggest that working cooperatively might achieve healthy environments and healthy economies, now and in the future, and minimize losses from disasters. The recommendations include: (a) creating demonstration projects within the area of intense 1993 flooding to illustrate ways that flood hazard mitigation and regional sustainability can advance together, (b) showcasing and monitoring exemplary programs that are already under way, and (c) considering such programs as centers of innovation waves and of voluntary adoption of sustainable land-management practices. The authors cite examples from Iowa.

Kelmelis, John A. (1994). Scientific river basin management. *Water Resources Update*, 97(Autumn), 9-13.
Keywords:
Midwest floods of 1993, federal programs, communication, methodology
Abstract: In response to the Midwest floods of 1993, the Clinton Administration recognized the need to make scientific information readily available to planners, managers, and policy makers in the basin area. To acquire and begin analyzing the data, the Scientific Assessment and Strategy Team (SAST) was established in November 1993. SAST was an interdisciplinary, interagency group that also provided scientific support to the Interagency Floodplain Management Review Committee. This article discusses the major findings of SAST and a strategy to incorporate scientific information into river basin management more effectively. The findings of SAST show clearly that using scientific information when making decisions could help reduce the impact of floods. Such information and advice must be derived from a well-coordinated plan of activities that incorporates baseline information, detects changes to the system, determines the effects of changes, improves methods of predicting changes, and makes the knowledge available to the user community.

Keptner, Tim and John Hamill. (1991). *NFIP Regulations: What You'd Change If You Could*. Madison, WI: Association of State Floodplain Managers.
Keywords:
compliance, floodplain management
Abstract: This report summarizes the results of a survey of local, state, and federal officials and private parties for recommendations for floodplain management regulations. The objective of the survey is to aid ASFPM in formulating positions to advocate for improving the NFIP. Respondents stated that current minimum regulations are inadequate and that NFIP regulations should be changed every five years. Officials were split over whether their own state or community would be willing to impose tougher restrictions on their own without federal mandate. Eighty-eight percent of respondents felt that requiring freeboard for new construction would reduce flood losses. Respondents supported prohibiting storage and disposal of hazardous materials and hazardous materials facilities in floodplains. Finally, state and local officials urged FEMA to change the practice of removing properties filled to BFE from the floodplain maps, based on the increased potential for flood damages.

Kerns, Waldon R., Robert J. Byrne, and Carl H. Hobbs. (1980). An economic analysis strategy for management of shoreline erosion. *Coastal Zone Management Journal*, 8(2), 165-84.

Keywords:
economic modeling, erosion, coastal areas, Virginia, property values

Abstract: The report outlines an economic framework for making management decisions on tidal shoreline erosion by evaluating of the impacts of coastal erosion on shore-land property and structures. It determined coefficients for estimating erosion-induced loses to property and dwellings. Lots that contained a dwelling decreased in value by an average of $0.24 for each square foot of soil lost to erosion. Decreases in the value of a dwelling due to an erosion-induced loss of distance between the dwelling and the shoreline averaged $8.64 per foot of distance lost. These values plus other measures were applied to three coastal areas in Virginia. The evaluation procedure provided a realistic basis for comparing: (a) the benefits and costs of selected erosion control measures, (b) the various levels of control, and (c) the distribution of costs of controls among property owners and between the private and public sectors.

Ketteridge, Anne-Michelle and Maureen Fordham. (1998). Flood evacuation in two Scottish communities: Lessons from European research. *International Journal of Mass Emergencies and Disasters*, 16(2) 119-43.

Keywords:
Scotland, flood disaster planning, risk communication

Abstract: In January 1993 and December 1994, two areas of Scotland experienced extensive flooding and large-scale evacuation of a spontaneous and unstructured nature. Both the flooding and the evacuation left their traumatic mark on the householders. The research reported here was qualitative, with the objective of investigating the evacuation process inductively—how it operated on the ground, what were the problems, and how the process could be enhanced to maximize effectiveness for those who have to experience the consequences. This long-term or extended process of evacuation is discussed in this paper, where it is emphasized that evacuation is not complete until everyone has returned home. The elderly, children, and women are also identified by the research as groups that suffered particularly as a result of the poorly executed evacuation and which require special attention. Policy and practical recommendations are drawn from the research, which may be equally applicable to future floods in the United Kingdom, Europe, and elsewhere.

Kirschenbaum, Alan. (1996). Residential ambiguity and relocation decisions: Population and areas at risk. *International Journal of Mass Emergencies and Disasters*, 14(1), 79-96.

Keywords:
relocation, health effects

Abstract: Residential relocation is one means of coping with living in a perceived high-risk area. An analysis of a sample of household members who live in such an area showed the extent to which fear of recurring emergency events affects attitudes toward seeking an alternative safer area in which to reside. Intent to relocate is linked to specific subgroups of families on the basis of how they comprehend the risks of remaining (educational level) and the extent of possible economic damage (level of assets). A series of independent variables reflected affective-emotive behavior during the disaster. Post crisis trauma related attitudes, and pre/post disaster

neighborhood bonds were likewise linked with an intention to move to a safer neighborhood. A regression model focused the analysis on the degree to which concern of psychological damage to children played a decisive role in determining a decision to relocate.

Klein, Robert. (1998). Regulation and catastrophe insurance. In Howard Kunreuther and Richard J. Roth, Jr., eds. *Paying the Price: The Status and Role of Insurance Against Natural Disasters in the United States*. Washington, DC: The Joseph Henry Press.
Keywords:
insurance
Abstract: This chapter assesses the role that insurance regulation has played in society's response to disaster risk and identifies the issues that must be addressed in evaluating how regulatory policy might be modified to help lower disaster costs and support a more efficient and equitable way to finance them. The chapter provides a brief overview of the structure of insurance regulation, focusing on its primary institutions and functions. The author also provides a detailed evaluation of the areas of regulation that most relevant to insuring disaster risk (e.g., regulation and its effect on availability and price and control of market entry and exit) and the options available to regulators to improve market conditions (e.g., financial regulations, policy forms and coverage requirements, rates, underwriting restrictions, and claims adjustment).

Kleindorfer, Paul R. and Howard Kunreuther. (2000). Managing catastrophe risk. *Regulation*, 23(4), 26-31.
Keywords:
mitigation, modeling, California, Florida, risk communication
Abstract: In this article the authors utilize computerized risk-mitigation measures (RMMs) models to examine the effect that risk mitigation increases would have on property owners and insurers. With this technology, the authors constructed statistical models of two earthquake-prone cities mimicking Oakland, CA, and Miami-Dade County, FL. They examined the reduction in damages that increased use of RMMs would have on these areas. In addition, they studied the effect that increased use of RMMs would have on the performance of two prototypical insurance companies, one small and large insurance company. The computer models indicate that mitigation would reduce aggregate losses to the insurer and the homeowner in both Oakland and Miami. If all homeowners mitigate in Oakland, the expected annual loss is $2.38 million. If all households in Miami employ RMMs it would reduce the total cost to homeowners by $1.46 million. Given the result that RMMs do save homeowners, insurers, and taxpayers money, why are these groups of people not doing more risk mitigation? The study suggests that homeowners do not invest voluntarily and insurers do not reward such investment behavior because of existing policies and decision-making limitations concerning their ability to judge and prepare for the consequences of rare events. Moreover, existing government programs dull the incentives for individuals and institutions to prepare for catastrophic natural disasters. A prescriptive approach would be to advocate insurance and mortgage reform so that the key players in the housing market would have the incentive to encourage homeowners to mitigate.

Klitzke, Michael J. (1992). *The Community Rating System: A True Story, Local Economic Application.* Madison, WI: Association of State Floodplain Managers.
Keywords:
Community Rating System, Illinois

Abstract: The study documents the flood risk in the Village of Wheeling, IL, and prescribes its optimum level of participation in the CRS program. The community adopted a floodplain management ordinance in 1963 and became part of the regular NFIP in 1978. It had 478 policies at the time of the study. After applying to the CRS program in 1990, it obtained a Class 9 rating, the maximum for a first-year applicant. The study addresses what CRS creditable activities are economically feasible and viable for the Wheeling to implement, compares the village's CRS application to others submitted nationwide, and finally prescribes activities for the village to optimize its CRS class rating. An evaluation of feasible activities found that there were additional points that could be obtained in three of four sets of activities. If all of the activities identified to be feasible for Wheeling were implemented, the village would qualify for a Class 7 rating. By optimizing potential point totals in three activities – a Flood Warning Program, an outreach program directed at repetitive loss properties, and amendment of stormwater management requirements – Wheeling could boost its CRS rating to Class 7. The village was well over the national average in points obtained for the top six creditable activities, due in part to the large portion of the town in the SFHA and the high number of policies in force.

Kochaniec, Joanne Wojcik. (1999). Flood of claims to come: Farms, businesses devastated by Floyd's rains. *Business Insurance,* 33(39), 1.
Keywords:
Hurricane Floyd, North Carolina, agriculture, flood damage
Abstract: Industry sources say that although big commercial policyholders and agricultural operations in North Carolina are likely to be insured for damages resulting from the severe flooding caused by Hurricane Floyd, most small businesses and individual property owners will likely be uninsured for those losses. According to Scott Ellwanger, manager of claims at FM Global in Park Ridge, IL, most large commercial policyholders use flood insurance from FEMA as a primary layer and reinforce this with excess coverage from a commercial property insurer. However, JoAnn Howard, Federal Insurance Administrator, says that typically only 25 to 50 percent of home and business owners in flood-prone areas buy flood insurance. This article also discusses the flood damage caused by Hurricane Floyd to farms and businesses in North Carolina.

KRC Research & Consulting. (1995). *Report on In-Depth Interviews Conducted with Direct Agents, Lenders, and WYO Agents.* Washington, DC: FEMA.
Keywords:
attitudes, marketing, lending institutions, communication, Write Your Own Program, Florida, Iowa, California
Abstract: FEMA sponsored this research to ascertain public attitudes toward disaster planning, particularly in regards to insurance coverage. The report is based on in-depth telephone interviews with three Write Your Own (WYO) agents, four independent agents, and three lenders in Broward County, FL; Des Moines, IA; and Santa Clara County, CA. The report summarizes findings but does not detail methodology or results. It reveals that agents have a poor understanding of FEMA's role and its relationship to the NFIP and few had direct contact with FEMA. Agents are generally satisfied with the status quo and do not prioritize flood insurance. Lenders feel like they know little about FEMA and the NFIP and they would like more contact with FEMA. The report concludes that communication between FEMA and lenders and agents merits improvement and lists suggestions from lenders and agents. Most of those

interviewed agreed that the public is not well informed about flood insurance, what it covers, and why they need it. Lenders felt a national advertising campaign was the best way to increase awareness in the public and among lenders. Agents were less open to a public education campaign believing that the public would not trust the government to sell them insurance. The report concludes that if those stakeholders interviewed are not invested in the NFIP's goals, then they will have only limited interest in selling flood insurance. Therefore, an effort should be made to develop and maintain a strong relationship with these groups to generate more interest in the purchase of flood insurance.

KRC Research & Consulting. (1995). ***Quantitative Benchmark Report*****. Washington, DC: FEMA.**

Keywords:
communication, marketing, risk communication, insurance purchase decision

Abstract: This document report looks at consumer and business decision-makers' attitudes towards and understanding of flood insurance. KRC Research & Consulting conducted a quantitative research study during September and October of 1995 and surveyed 1,200 consumers and 600 business decision-makers (1/3 of the total sample obtained from high-risk areas, 2/3 from a random national sample, in each case) by telephone. This report concludes that: (a) FEMA and NFIP are not well known among either consumers or business decision-makers; (b) 52 percent of consumers and 40 percent of business decision-makers who know FEMA view it favorably; (c) floods and hurricanes are top-of-the-mind natural disasters for most respondents, but few feel personally threatened by floods (even those who live in high-risk areas); (d) in the event of a flood, most would expect their insurance company to cover damages; (e) about half of each group think the government should pay for clean up and repair after a natural disaster; (f) about half of each group has taken precautions in the event of a natural disaster (efforts vary but most often include references to insurance: 24 percent of consumers and 43 percent of businesses); and (g) while most consumers think flood insurance is a wise investment (65 percent), most business decision-makers don't (37 percent). Based on these findings, this report recommends that FEMA: (a) get the NFIP on the map, using any and all means possible; (b) break through the assumption that fires are a greater danger than floods; (c) educate people about the measures of risk and convince them to ask their agents to make sure they have flood insurance; (d) educate the target audience as to exactly what flood insurance covers; (e) explain the concept of a federal disaster area; (f) tell the target audience that flood insurance is available through an insurance agent and that it is relatively inexpensive; and (g) use a flood victim as a spokesperson instead of a fictional character.

KRC Research & Consulting. (1995). ***Qualitative Research Report: In-Depth Interviews with Community Officials, Lenders, Realtors, and Advisory Board Members*****. Washington, DC: FEMA.**

Keywords:
awareness, communication, marketing, insurance purchase decision

Abstract: FEMA retained KRC Research to conduct qualitative research with four key audiences—lenders, realtors, community officials, and members of an advisory board—to help guide the development of strategies and creative messages to facilitate the sale of flood insurance. In August 1995, KRC conducted 27 in-depth interviews with these key audiences. This report summarizes general perceptions of the insurance industry, obstacles to understanding

the flood insurance industry, perceptions of the NFIP, the public's decision-making process, and suggestions for an awareness-raising campaign. Respondents felt that lack of knowledge about flooding, risk, and insurance is the primary reason people do not own flood insurance. Eligibility and coverage are major areas of confusion. While advisory board members have a good knowledge of the NFIP, the other respondents are largely ignorant about the program. The four constituencies agreed that the insurance industry does not have a good public image and that disaster insurance is generally unprofitable. They felt that retention is mainly the result of compliance with insurance requirements. All respondents felt that an education campaign is critical to improving the volume of flood insurance sold. They called for improved communication between the NFIP, themselves, and the public, and they expressed enthusiasm for an advertising campaign.

KRC Research & Consulting. (1998). ***Agent Quantitative Survey Results.*** **Washington, DC: FEMA.**

Keywords:
insurance agents, communication, risk communication

Abstract: KRC conducted a quantitative 20-minute telephone survey to investigate insurance agents' knowledge, perceptions, practices, attitudes, and beliefs about what flood insurance covers; writing policies; and the benefits of flood insurance. The survey contained two components, one with a nationally representative sample of 300 agents who sell flood insurance (flood agents), and another with 100 agents who do not sell flood insurance (nonflood agents). The survey reveals that flood agents are much more aware of and favor FEMA and the NFIP than nonflood agents. Second, in both groups, the decision to sell flood insurance is closely related to the agents' opinions of flood risk in the area where the client resides. Nine of ten agents would be more inclined to recommend flood insurance if they learned their clients were in areas with a high risk of flooding or that a flood was predicted for their client's area. Third, it may be difficult to sell flood insurance to clients who do not believe they are at risk or who think that the insurance is too expensive. Communications should continue to emphasize that virtually everyone is at risk for flooding, and that flood insurance is not as expensive as some might think. Fourth, flood agents are more likely to know that floods are likely to occur even in areas not designated as floodplains and therefore know that these people also need insurance. Fifth, the majority of flood agents believe that flood insurance is a wise investment, offering excellent coverage at a fair price. In contrast, nonflood agents do not think it is a wise investment given current levels of coverage and the price. Sixth, flood insurance is not seen as an overly difficult policy to write, but the rating system and the process of obtaining elevation certificates are seen as more difficult and time-consuming. Most agents indicate that learning that there is an easy-to-write policy available for 90 percent of homeowners would prompt them to recommend flood insurance. Agents aware of the Co-op Advertising Program believe it to be a good one.

KRC Research & Consulting. (1999). ***Quantitative Evaluative Report IX, 1999*****. Washington, DC: FEMA.**

Keywords:
NFIP, awareness, communication, marketing

Abstract: This report details the ninth wave of tracking research to assess the attitudes of consumers and business decision-makers (BDMs) regarding the need for, and understanding of, flood insurance and the success of an advertising campaign. Conducted from January through

April 1999, FEMA Quantitative IX consisted of telephone interviews with 1,200 consumers and 600 BDMs from a random national sample and from high-risk areas. The study assessed perceptions of natural disasters in general but floods represented the primary focus. The study considered flood risk, insurance companies and agents, awareness and perceptions of FEMA advertising, and knowledge of flood insurance. KRC found the percentage of consumers and BDMs who, in the last two months, saw or heard an ad for flood and/or disaster insurance. The firm then determined the messages these listeners received from the ad and ascertained the awareness of and favorability toward FEMA and the NFIP. The report concludes that the advertising campaign continues to increase familiarity and favorability toward FEMA and the NFIP among consumers and BDMs, but the percentage of respondents who are aware of the ads could be higher. KRC recommends that FEMA: (a) spend more on the campaign, (b) continue to emphasize that floods can happen anywhere and make the connection between flooding and permanent water damage, (c) make the point that flood insurance is a wise investment, (d) include a single response mechanism at the end of the ad, (e) communicate that floods often occur alongside hurricanes and that current coverage may be insufficient, and (f) inform insurance agents about the risk of flooding and about the ease with which flood insurance may be written and serviced.

Kriesel, W. and C. Landry. (2000). Modeling the decision to buy flood insurance: Results from 62 coastal communities. Paper presented at the *American Agricultural Economics Association Annual Meeting*, Tampa, FL, July 29-August 3, 2000.
Keywords:
coastal areas, insurance purchase decision, economic modeling, risk assessment
Abstract: The authors analyze how a household decision to purchase flood insurance relates to other measures of risk reduction and particular aspects of flood and erosion risk. They argue five reasons why the NFIP does not have a higher rate of participation among property owners at risk of flooding: (a) government disaster relief programs provide a disincentive for purchasing flood insurance; (b) people tend to underestimate their chances of being a disaster victim; (c) the NFIP may undercompensate for losses; (d) coastal property owners regard the expected value of the potential loss as only a small part of their total wealth; and (e) the model's results apply only to risk-averse individuals. Results indicate that the variables of income, waterfront (percent of properties that have frontage on the water), armor (percent of survey returns indicating the existence of coastal armoring at the nearest shore), elevation, post-FIRM status, mortgage, location in the Pacific Region, and location in the Gulf Region have significance (at the .05 level or below) in predicting the proportion of a community's properties protected by flood insurance.

Kriesel, Warren, Craig Landry, and Andy Keeler. *Coastal Erosion Hazards: The University of Georgia's Results.* Working paper. Athens, GA: University of Georgia.
Keywords:
property values, economic modeling, insurance purchase decision, coastal areas, erosion, insurance coverage, risk assessment, environmental impacts, public policy
Abstract: This study examines the economic effects of flood insurance pricing and availability, as they relate to housing values, the local community, and the coastal ecosystem. Three types of changes to the NFIP are being considered: (1) a change in the cost of insurance, (2) denial of flood insurance, (3) a change in the rules that apply to coverage of erosion-related damage. Five sections of the report describe general results of a mail survey, a hedonic price analysis, an

empirical model of property owners' decisions to buy flood insurance, an experiment on how property owners might respond if additional erosion-damage coverage were offered under the NFIP, and how property values decline if beach recreation is adversely affected by coastal armoring. Overall, the study finds that hazards from flooding and erosion, and the actions taken against them significantly determine property values in coastal areas. However, flood insurance was not found to have an important role in the real estate market. Furthermore, the demand for flood insurance was found to be unresponsive to price changes. A prohibition on new construction within the 60-year erosion hazard area would increase property values and perhaps reduce disruptions to the coastal ecosystem if the parcel of land is sufficiently large. Coastal armoring increases the value of waterfront properties but if the recreational beach is damaged, then the value of inland property will be reduced sharply.

Krimm, R.W. (1978). The National Flood Insurance Program and wetland protection. In *Proceedings of the National Wetland Protection Symposium*, Reston, VA, June 6-8, 1977, 123-5. Washington, DC: FEMA.
Keywords:
floodplain management, wetlands, environmental protection
Abstract: The NFIP was designed to reduce loss of life and property from floods. Part of the program's responsibility involves the development and enforcement of floodplain management standards to reduce flood damages. Regulations recently adopted require that communities wishing to qualify for the program protect mangrove stands and dunes that act as barriers to storm surges. The program also indirectly protects wetlands in several ways: it establishes disincentives for location of structures in areas of known flood risk; it prohibits the use of fill for elevation purposes in identified coastal high hazard areas; and it encourages the use of columns for elevation to minimize the use of fill. The article also discusses recent executive orders concerning wetlands and floodplains and their relation to the NFIP.

Krutilla, John V. (1966). An economic approach to coping with flood damage. *Water Resources Research*, 2(2), 183-90.
Keywords:
mandatory purchase, insurance premiums, flood control, economic modeling
Abstract: A compulsory flood insurance scheme is one means of achieving efficient uses of floodplains. Insurance premiums proportional to risk and equal to both the private and social cost of floodplain occupancy will serve as a rationing device, eliminating economically unwarranted uses of floodplains on the one hand, while not prohibiting uses for which a floodplain location has merit on the other hand. In addition, reduction of flood insurance premiums can serve as a standard to measure the economic justification of alternative flood control measures and/or discrete increments in scale of protective works or other nonstructural flood control measures. A final advantage of flood insurance, which no alternative in flood management possesses, is indemnification for the residual damage potential against which it is not economical to seek protection.

Kuczera, George. (1983). A Bayesian surrogate for regional skew in flood frequency analysis. *Water Resources Research*, 19(3), 821-32.
Keywords:
modeling

Abstract: Kuczera considers the problem of how to best utilize site and regional flood data to infer the shape parameter of a flood distribution. Bulletin 17B of the US Water Resources Council (1981) approaches the problem with a log-Pearson distribution. This article considers a lesser-known distribution. The power normal that fits flood data as well as the log-Pearson and has a shape parameter denoted by ? derived from a Box-Cox power transformation. The problem of regionalizing ? is considered from an empirical Bayes perspective where site and regional flood data are used to infer ?. The distortive effects of spatial correlation and heterogeneity of site sampling variance of ? are explicitly studied with spatial correlation being found to be of secondary importance. The end product of this analysis is the posterior distribution of the power normal parameters expressing, in probabilistic terms, what is known about the parameters given site flood data and regional information on ? This distribution can be used to provide the designer with several types of information. It derives the posterior distribution of the *T-year* flood and illustrates the effect of nonlinearity in ? on inference. Because it explicitly allows for uncertainty in ?, it avoids the understatement in confidence limits due to fixing ? (analogous to fixing log skew). Finally, the report shows to obtain the marginal flood distribution, which can be used to select a design flood with specified exceedance probability.

Kunkel, Kenneth E., Stanley A. Changnon, and Steven E. Hollinger. (1993). A regional response to climate information needs during the 1993 flood. *Bulletin of the American Meteorological Society*, 76, 2415-21.

Keywords:
Midwest floods of 1993, flood disaster planning, modeling, weather

Abstract: Effective responses by government agencies, businesses, and private industry to climate disasters like the Mississippi River flood of 1993 hinge on the regional availability of up-to-date weather, climate, and water information. In addition to the obvious need for accurate forecasts and warnings of severe weather and floods, other types of meteorologically based information can contribute to effective responses. Some examples of information requested during and after the 1993 flood include hydroclimatic assessments of the magnitude of the event, agricultural assessments of the impacts of heavy rains and flooding on corn and soybean production, and probabilistic outlooks of the recurrence of flooding based on soil moisture conditions. The authors conclude that quick responses to these needs necessitate: a real-time climate monitoring system, physical models to assess effects and impacts, and scientific expertise to address complex issues.

Kunreuther, Howard. (1979). The changing societal consequences of risks from natural hazards. *The Annals of the American Academy of Political and Social Science*, 1979(443), 104-16.

Keywords:
disaster assistance, insurance purchase decision

Abstract: This article points out that the federal government has given substantial relief to victims of natural disasters in recent years, largely because such individuals often are not protected by insurance. Standard insurance protects against fire, wind, and hail; flood and earthquake policies can also be purchased, but most residents of hazard-prone areas have not done so. Recent empirical findings support a bounded rationality model of individuals' decisions about unlikely, though potentially severely harmful, events which indicates that individuals must

be made graphically aware of the need for insurance to consider purchase. The author concludes that informal networks of friends and neighbors guide those who decide to do so.

Kunreuther, Howard. (1996). Mitigating disaster losses through insurance. *Journal of Risk and Uncertainty*, 12(2-3), 171-87.
Keywords:
lending institutions, Hurricane Andrew, insurance industry, mitigation
Abstract: Losses from natural disasters have increased in recent years due to population increases in hazard-prone areas and inadequate enforcement of building codes. This article contends that until recently, insurers viewed their role as a pass-through mechanism rather than as a promoter of safety. Following Hurricane Andrew, the insurance industry has taken a new view toward mitigation measures because of the severe losses that they incurred. The article proposes a disaster-management program that utilizes insurance coupled with well-enforced building codes to reduce future damage. Banks and financial institutions play a key role in this program by requiring inspections of homes as a condition for a mortgage. New forms of reinsurance coverage against catastrophic losses from natural disasters are necessary to protect insurers against potential insolvency from the next mega-disaster.

Kunreuther, Howard. (1998). A program for reducing disaster losses though insurance. In Howard Kunreuther and Richard J. Roth, Jr., eds. *Paying the Price: The Status and Role of Insurance against Natural Disasters in the United States*. Washington, DC: The Joseph Henry Press.
Keywords:
insurance purchase decision, Hurricane Andrew, risk communication
Abstract: The author looks at the market for insurance against natural disasters by addressing the following questions: What are the factors influencing property owner's demand for insurance? Why are insurers reluctant to provide coverage against hurricanes, floods, and earthquakes? Regarding the demand for insurance, the author concedes that what determines the demand for insurance when individuals have the freedom to specify coverage limits is still not well understood. Many homeowners at risk are not anxious to purchase insurance voluntarily because they feel the disaster will not happen to them. Others who have compared premiums with potential benefits may feel that insurance is not a good investment. The author also points out that the framing of the insurance decision process is relevant. For instance, some factors that may encourage individuals to buy an insurance policy against natural disasters are the vividness of the media's reporting, the use of rebates so that policyholders feel they have experienced a gain if they do not collect their policies, and the use of the status quo as a reference point. On the supply side, the author argues that private insurers are averse both to risk and ambiguity, which make them follow a safety-first approach in their business decisions (in other words, the author suggests that insurers are first concerned with the safety of their firms, and then, with profit maximization). Therefore, the author concludes that private insurers have been reluctant to promote coverage against hurricanes, floods, and earthquakes because of uncertainty regarding the risk and because of concern with what the financial consequences of a natural disaster would be for their companies. Hurricane Andrew and the Northridge earthquake were wake-up calls for many firms, alerting them to the possibility of insolvency following another major event. The author suggests several measures to improve the market for insurance against natural disasters. He implicitly argues in favor of reducing the ambiguity insurers and individuals face. Some of

the measures the author suggests are the provision of better information on cost-effective mitigation alternatives, as well as better enforcement of current policies (e.g., building codes). The author argues that public sector agencies have the role to assist low-income families in adopting cost-effective measures. Finally, because public sector damage from natural disasters results in a large cost to taxpayers, the author suggests that government officials should be encouraged to purchase insurance for public structures and invest in cost-effective risk reduction measures.

Kunreuther, Howard and Louis Miller. (1985). Interactive computer modeling for policy analysis: The flood hazard problem. ***Water Resources Research*****, 21(2), 105-13.**
Keywords:
modeling, disaster planning
Abstract: This paper discusses an interactive modeling system to support policy analysis for dealing with flood hazards. Policy analysis in this area is complex because there are diverse stakeholders with varying concerns, there are a variety of scenarios that might be considered, and there are similar alternative policy options. These conditions require that a modeling system be flexible and support users in a variety of ways. The system should be viewed as a decision aid rather than a burden. The modeling system described in the paper can achieve these goals for micro-analytic models and handle samples of homeowners in a flood-prone community.

Kunreuther, Howard C. and Gilbert F. White. (1994). The role of the National Flood Insurance Program in reducing losses and promoting wise use of floodplains. ***Water Resources Update,*** **95(Spring), 31-5.**
Keywords:
enforcement, insurance purchase decision, NFIP
Abstract: This paper discusses the NFIP's objectives and accomplishments. Due to the NFIP's apparent failure to meet its original objectives, the article provides several hypotheses that should be tested. Concerning the demand for insurance, the article hypothesizes that the failure of most floodplain dwellers to purchase insurance when not required to do so is due primarily to their belief that a damaging flood will not occur during their occupancy of the structure. It also conjectures that underinsurance is due to the limited enforcement by banks and other lending institutions of the required coverage. With respect to the supply of insurance, the article hypothesizes that there are limited financial incentives for private insurance agents to promote flood coverage. The authors make five recommendations related to increasing the coverage under the NFIP and increasing the quality and use of flood mitigation activities.

Kunreuther, Howard and Richard J. Roth, Jr., eds. (1998). ***Paying the Price: The Status and Role of Insurance against Natural Disasters in the United States*****. Washington, DC: Joseph Henry Press.**
Keywords:
Florida, Hurricane Andrew, insurance purchase decision, liability, insurance industry, mitigation
Abstract: This book reviews reasons for consumer resistance to flood insurance purchase. It considers the effectiveness of insurance coverage for low-probability, high-consequence events such as natural disasters and how insurance programs can successfully be used with other policy tools, such as building codes and standards, to encourage effective loss reduction measures. The authors discuss the reasons for the dramatic increase in insured losses from natural disasters

since 1989 and the concern that insurers have about their ability to provide coverage against more such events in the future. It addresses why there has been an increasing demand for hazards insurance, what types of coverage private insurers are willing to offer, and the role of reinsurance and public-/private-sector initiatives at the state and federal levels for providing protection to victims of natural disasters. Detailed case studies of Florida in the wake of Hurricane Andrew in 1992 and California in the wake of the Northridge earthquake in 1994 reveal the challenges facing the insurance industry as well as other concerned stakeholders. The NFIP illustrates how a public-/private-sector partnership can mitigate damages and provide financial protection to victims. The book identifies new initiatives for reducing future losses and providing funds for recovery through cooperation by the relevant parties.

Kusler, Jon A. (1982). *Regulation of Flood Hazard Areas to Reduce Flood Losses: Volume 3.* Boulder, CO: Natural Hazards and Applications Information Center, University of Colorado.
Keywords:
floodplain management, development, coastal barriers
Abstract: The author looks back to the 1970s at the use of federal regulations, including flood insurance, as one element of a national strategy to manage floodplains. The author has concern that during the NFIP's emergency phase, the program had encouraged unwise floodplain and wetland development in coastal areas or barrier islands. The author also points out that, although it is difficult to separate the importance of insurance from other factors that foster development, most research tends to support the idea that the flood insurance program has encouraged development.

Kusler, Jon A. (1994). Flood response and the restoration of wetlands, riparian areas, and broader floodplains: Lessons learned from the Great Flood of 1993. *Water Resources Update*, 97(Autumn), 25-8.
Keywords:
Midwest floods of 1993, environmental restoration
Abstract: Efforts by federal, state, and local governments to restore wetlands and floodplains after the flood of 1993 provided many lessons that should be applied in future efforts. Floods do create restorative opportunities. But, there are also severe impediments to restoration in postflood contexts given the limited statutory goals of post disaster programs that do not address the restoration of natural systems, the narrowly targeted funding, the lack of preflood assessments and plans, the lack of coordination of agency efforts, and the need to deal with immediate and real suffering and human needs. New institutional mechanisms are needed both to identify general restoration opportunities prior to flood events as part of broader ecosystem management planning and to rapidly assess specific restorative opportunities after a flood event. The article lists several specific recommendations (consistent with the overall recommendations of *Sharing the Challenge*) both for the Mississippi Basin and other future contexts.

Kusler, Jon A. and Patricia Bloomgren. (1984). *Improving the Effectiveness of Floodplain Management in High Risk Areas.* Madison, WI: Association of State Floodplain Managers.
Keywords:
coastal areas, erosion, alluvial fans, ice jams

Abstract: This report identifies types of flood hazard areas, such as alluvial fan and ice jam flooding areas, where special risks are posed to life and property and existing floodplain management practices are inadequate. The report describes the federal, state, and local approaches to dealing with such areas, and recommends improvements. Flood hazard areas of special risk are widespread and prevalent and contribute greatly to insurance losses. Existing mapping, regulatory, and insurance approaches do not adequately account for characteristics of special risk areas, such as velocity, debris in the water, and flooding of extended duration. Lack of data on flood risks and insufficient dissemination of information are two obstacles to managing areas of special risk that may be overcome by programmatic improvements.

Kusler, Jon A. and Larry Larson. (1993). Beyond the ark: A new approach to U.S. floodplain management. ***Environment,*** **35(5), 7-11, 31-4.**
Keywords:
environmental impacts, floodplain management, nonstructural approaches
Abstract: The authors point out that traditional floodplain management emphasizes structural changes such as dams, levees, channel alteration, and shoreline protection. Other impacts of flooding are ignored because approaches emphasize minimizing structural losses. These impacts include deterioration in water supply, erosion, sedimentation, nonpoint source water pollution, or damage to wetlands and natural habitats. The authors suggest bringing floodplain management under the umbrella of broad, multi-objective watershed management planning, and emphasize the importance of local community participation in such an approach. Their approach requires a change in the role of federal agencies from "supermanagers" of the nation's floodplains to facilitators of state and local programs. The authors acknowledge that bureaucratic inertia and opposition from certain interest groups may make such an approach difficult to implement, but they maintain that the benefits would ultimately justify the effort.

Kusler, Jon A. and Thomas M. Lee. (1972). ***Regulations for Flood Plains.*** **Chicago, IL: American Society of Planning Officials.**
Keywords:
floodplain management, zoning, public policy
Abstract: Of the land-use controls required as prerequisites for participation in the NFIP, the local floodplain management ordinance receives primary attention in this report. The report describes the place of the zoning ordinance in comprehensive floodplain management by introducing planners to the major elements that should comprise a local ordinance. The central findings of case law on floodplain regulations to date are summarized in Part IV. In Part VI, the kinds and sources of hydraulic data are classified and then the utility of those data for developing legally valid ordinances is described in text and drawings. The report concludes with text for a local floodplain management ordinance, with modifications therein to fit the conditions of four hypothetical communities.

Landman, Georgina B. and T.W. Ihloff. (1976). The legal aspects of floodplain zoning and management: An annotated bibliography. ***Council of Planning Librarians,*** **26.**
Keywords:
zoning, floodplain management, legislation, legal issues and litigation
Abstract: This bibliography contains materials devoted primarily to the legal aspects of floodplain regulations including floodplain zoning and management. In addition, the

bibliography covers the economic aspects of flood insurance; the planning, engineering, and geographic aspects of floodplain management; government documents and publications; as well as abstracts on land-use planning.

Larson, Larry A. (1993). The Mississippi flood. *Environment,* 35(10), 4-6.
Keywords:
Midwest floods of 1993, agriculture
Abstract: In this commentary, the author agrees with the analysis and conclusion of an article by Mary Fran Myers and Gilbert F. White dealing with the 1993 floods in the Midwest. He discusses farmers and the lack of levee protection, farmers' concerns about environmental groups, and the desire to change farmland to protected wetlands.

Larson, Larry A. and Doug Plasencia. (2001). No Adverse Impact: A New Direction in Floodplain Management Policy. *Natural Hazards Review,* 2(4), 167-81.
Keywords:
development, economic impacts, floodplain management, mitigation, public policy
Abstract: Annual flood losses in the nation continue to worsen despite 75 years of federal flood control and 30 years of the NFIP. This trend is due primarily to federal policies that have encouraged at-risk development, provided for insufficient consideration of the impact of that development on other properties and on future flood and erosion potentials, justified flood control projects based on a cost-benefit ratio that favors an intensification of land uses within the floodplain, and engendered an unhealthy reliance on federal resources by state and local governments. The authors propose a new "no adverse impact floodplain" approach that shifts the focus from the techniques and standards used for flood-prone development to how adverse impact resulting from those land-use changes can be planned for and mitigated. The proposed policy promotes community involvement and planning, sustainable development, and local land-use management, with consideration for private property rights.

Laska, Shirley Bradway. (1986). Involving homeowners in flood mitigation. *American Planning Association Journal,* 52(4), 452-66.
Keywords:
Louisiana, mitigation
Abstract: This article summarizes efforts by floodplain managers to encourage homeowners to take action on their own property to minimize flood damage. The author challenges earlier conclusions that homeowners would not be involved in mitigation efforts. Using case studies from Slidell, LA, in 1983, about 18 months after major flooding had occurred, the article shows that homeowners who had experienced recent flooding are interested and willing to participate in mitigation. The author than examines recommendations for improving homeowners' involvement in mitigation and considers changes in the roles of federal, state, and local government.

Lave, Tamara and Lester B. Lave. (1991). Public perception of the risks of floods: Implications for communication. *Risk Analysis,* 11(2), 255-67.
Keywords:
Pennsylvania, risk communication, awareness

Abstract: The authors point out that since the late 1960s, the federal government emphasized flood insurance as the primary tool for improving construction location, informing flood-proofing decisions, and providing reimbursement for flood damage. Interviews conducted with 22 residents of three flood-vulnerable communities in Pennsylvania reveal that most respondents had little knowledge of the cause of floods or of what could be done to protect themselves and their property. The authors conclude that there was little effective communication about the nature and magnitude of flood risks or of the measures people can take to lessen physical and economic loss. The authors suggest the need for a risk management program that emphasizes more adequate communication as well as the enforcement of the current (1991) law requiring people at risk and who hold federally funded loans to have flood insurance.

Leatherman, Stephen. (1997). ***Flood Insurance Availability in Coastal Areas: The Role It Plays in Encouraging Development Decisions.*** **Washington, DC: FEMA.**
Keywords:
coastal areas, Delaware, development
Abstract: This report focuses on North Bethany Beach, a coastal community in Delaware. The author concludes that the availability of flood insurance has had no real impact on coastal development. In contrast, the availability, or lack thereof, of flood insurance has had a negative effect in the development of low-priced lots. The author argues that the main factors that promoted beachfront development among the affluent were, in order of importance: proximity to major metropolitan areas, limited supply of desirable property in the face of increasing demand, lifestyle issues, elite development with private beaches, and the strength of the economy. The availability of flood insurance is, according to the author, much less of a factor.

Lecomte, Eugene and Karen Gahagan. (1998). Hurricane insurance protection in Florida. In Howard Kunreuther and Richard J. Roth, Jr., eds. ***Paying the Price: The Status and Role of Insurance Against Natural Disasters in the United States.*** **Washington, DC: The Joseph Henry Press.**
Keywords:
insurance agents, Florida, Hurricane Andrew, liability, modeling
Abstract: The authors contend that of hurricanes that struck Florida in the 1990s, Hurricane Andrew in particular, revealed the precarious financial position of many insurers in the state. Due to the magnitude of insured losses inflicted by Hurricane Andrew, the immediate post-storm reaction of several insurance companies was an attempt to reduce their underwriting exposure. Some of the factors that influenced such actions included: (a) the inability to obtain adequate reinsurance for new and existing risks in Florida, (b) the availability of new information from catastrophe risk models indicating that existing levels of exposure might be more significant than previously realized, (c) significant reductions in insurers' policyholders surplus as a result of Hurricane Andrew, (d) concerns about rate adequacy, especially for coastal counties, and for certain classifications of risk such as condominiums, (e) "hidden" exposures resulting from potential assessments by various other mandated mechanisms (e.g., residual markets, catastrophe funds, etc.), and (f) fear that an unfavorable catastrophe exposure would negatively impact the rating by agencies such as A. M. Best and Standard and Poors. Some initiatives had been implemented to alleviate these problems. An initiative proposed by the Florida Insurance Council (FIC) called for an agreement establishing post-hurricane cooperation between the FIC, the state insurance department, and state and local emergency management officials. In addition,

the governor created a Building Codes Study Commission to evaluate the effectiveness of the building code system. Finally, the Florida Commission on Hurricane Loss Projection Methodology examined the role of computer models in determining insurance rates.

Leikin, Howard and Thomas Hayes. (1999). ***National Flood Insurance Program Flood: Insurance Rate Review*****. Washington, DC: FEMA.**
Keywords:
insurance premiums, subsidies
Abstract: This report reviews the NFIP's rating structure. One of NFIP's goals is to generate a target level of premium income at least sufficient to cover expenses and losses relative to what is called the "historical average loss year." The estimate of rates accommodates the portion of NFIP customers who pay less than full risk premiums (a subsidy provided by statute) and the portion who pay full risk premiums. In 2000, the distribution is anticipated to be 32 percent at subsidized rates and 68 percent at full-risk premium rates. FIA estimates that, were the catastrophic contingency contemplated in establishing all rate levels, the pre-FIRM subsidized portion of the business would have to pay about two-and-one-half times the current premium and the overall target level for premiums would have to increase on the order of 50 to 100 percent. The rate review also discusses generally accepted actuarial principles of ratemaking, overall rate level indications, target level premium analysis, rate review results, increased cost of compliance, expense constants, and the federal policy fee. The rate review indicates that written premiums based on all rate and rule changes through May 2000 are expected to be 118 percent of the level needed to fund the historical average loss year.

Leonard, Barry. (1999). ***Answers to Questions about the National Flood Insurance Program*****. Collingdale, PA: DIANE Publishing Company.**
Keywords:
awareness, NFIP
Abstract: This book acquaints the reader with the NFIP. It is designed for persons who do not need a detailed history or refined technical or legal explanations, but who do need a basic understanding of the program and the answers to some frequently asked questions. This book includes an introduction to the NFIP, flood insurance information for prospective buyers, information on coverage, and directions on how to complete a flood insurance claim. It also includes floodplain management requirements, flood hazard assessments and mapping requirements, important addresses, a phone directory, a list of available publications, and the address for obtaining the coordinator's manual for the Community Rating System.

Leonard, Barry. (1999). ***Mandatory Purchase of Flood Insurance Guidelines*****. Collingdale, PA: DIANE Publishing Company.**
Keywords:
mandatory purchase, lending institutions
Abstract: This book includes a brief description of the mandatory purchase requirement. It uses flowcharts, details coverage availability, and outlines general provisions of mandatory purchase. The book also discusses the specificities of condominiums, cooperatives, and timeshares and mentions key provisions, legal references, lender regulations, statutory provisions, notice requirements, NFIP resources, the standard flood hazard determination form, the waiting period for policy issuance, private flood insurance criteria, and key terms.

Leopold, Luna B. (1994). Flood hydrology and the floodplain. *Water Resources Update*, 95(Spring), 11-4.
Keywords:
floodplain management, hydrology and hydraulics, easements, structural approaches
Abstract: This article considers the possibility of utilizing the natural function of floodplains in conjunction with engineering works such as levees and dams. The extent of flood damage reduction achieved by allowing some floodplain areas to flood, its potential benefits and costs, and the locations and distribution of such benefits and costs, have not been studied in an organized way. While valuable theory and practice are available to compute the efficacy of using temporary storage of floodwater to decrease the downstream peaks, this theory has not been put to use in flood control policy. Furthermore, the technology to make field measurements is available. Finally, the article suggests that the purchase of easements for temporary flooding of some areas would decrease the amount of future disaster relief and would be a more permanent solution to some flood control needs.

Leopold, Luna B. and Thomas Maddock, Jr. (1954). *The Flood Control Controversy*. New York, NY: The Ronald Press Company.
Keywords:
flood control, hydrology and hydraulics, public policy, riverine areas
Abstract: This book examines the controversial aspects of flood control in terms of the technical problems present in 1954. Starting with concrete knowledge about the hydrology of rivers and floods, the authors show the possibilities and limitations both of engineering structures and land management. They demonstrate that flooding can never be completely eliminated in a river system. The major part of the book analyzes the effectiveness of upstream and downstream programs for flood control, as advocated by the Department of Agriculture and the Army Corps of Engineers. In discussing general problems of policy, the authors present cogent arguments for redefining the federal interest in flood control and for apportioning the costs and benefits more logically both for the groups who need flood protection and for the nation. Lastly, the authors provide an assessment of flood control measures in 1954 and a lucid presentation of the hydrologic facts that have been overlooked.

Leuchtenburg, William E. (1972). *Flood Control Politics: The Connecticut River Valley Problem, 1927-1950*. New York, NY: Da Capo Press.
Keywords:
Connecticut River Valley, flood control
Abstract: This book considers the attempt to provide flood control in the Connecticut River Valley between 1927 and 1950 and outlines the conflicts that arose. The primary conflicts, which are thought of as microcosms of the political struggles of the period, occurred between the federal and state governments over the best uses for the resources in the valley and between competing special interests over the allocation of those resources.

Lewis, Gary L. (1992). Jury verdict: Frequency versus risk-based culvert design. *Journal of Water Resources Planning and Management,* 118(2), 166-184.
Keywords:
Wyoming, legal issues and litigation, liability

Abstract: A federal district court jury in Cheyenne, WY, ruled that an act-of-God defense could not be used when a railroad culvert backed water onto residential properties during a catastrophic "10,000-year" rainstorm. The culvert capacity not only met, but also exceeded, industry design standards, yet the jury decided that the railroad was negligent for not installing a structure large enough to accommodate the "monster" storm. The 5-ft-diameter culvert, installed to replace a larger, deteriorating trestle, was sized by frequency-based methods to discharge the 50-year peak flow rate, with a nominal surcharge anticipated during the 100-year event. Both sides agreed that the selected structure could have safely passed a more than 500-year event, but was not able to discharge all the flows from the freak storm. Backwater pooled 9 ft over the top of the culvert, flooding more than 20 basements in one subdivision. This paper reviews several matters debated during the trial and in subsequent analyses, presented as a case study from the writer's perspective. The writer provided expert analysis for the defense, but was called to the stand as a witness for the plaintiff. The jury held the defendant liable for the damages and cited the defendant as negligent for not anticipating the storm and for failing to consider the risks to homeowners. Under court order, a large structure is to be installed. The article also discusses the implications for improvements in drainage design and expert testimony.

Lichtenberg, Erik. (1994). Sharing the challenge? An economist's view. *Water Resources Update*, 97(Autumn), 39-43.
Keywords:
public policy, floodplain management, cost-benefit analysis
Abstract: This article addresses the following issues included in the recommendations of *Sharing the Challenge*: (a) economically efficient flood risk management; (b) preservation and enhancement of the natural resources and functions of floodplains; (c) organization of floodplain management through the coordination of federal, state, and local agencies; (d) use of flood insurance to internalize the costs of floodplain development; and (e) the role of the federal government in floodplain management. Several implications about floodplain management follow from the general economic perspective presented. First, reducing expected flood damage should not be a goal of floodplain management per se; rather, the appropriate level of protection from flooding should equate the marginal social benefits of expected damage reduction with its marginal social cost. Second, over time, some flood losses are certain to occur, even under optimal policy. Third, the concept of the Standard Project Flood should have little or no place in floodplain management. Instead, the level of protection for every location should equate marginal social benefit with marginal social cost.

Lind, Robert C. (1967). Flood control alternatives and the economics of flood protection. *Water Resources Research*, 3(2), 345-57.
Keywords:
economic impacts, flood control, insurance, structural approaches, zoning
Abstract: This paper discusses and compares the economic effects of alternative programs for coping with flood losses (e.g., structural transformation of the river bed, which includes dams, levees, channel improvements, etc.; flood insurance; flood warning and evacuation systems; floodproofing; and flood zoning). The author argues that structural flood-control measures such as dams alter the stream flow so as to change the distribution function associated to flood losses. Thus, structural protection, by eliminating the smaller, more frequent floods that account for a large part of total flood losses, thereby reduces the expected value of losses. Floodproofing,

flood warnings, and evacuation systems do not alter flood frequency but lower the level of flood damage associated with a given level of flooding. Flood insurance does not reduce the expected value of losses. Flood zoning may aim to reduce expected losses by affecting the pattern of development of the floodplain. However, the author states that it is very likely that in practice flood zoning will exclude some activities that could profitably locate in the floodplain. The author concludes that from an economic perspective, flood zoning is not a desirable method of coping with flood loses. Flood zoning could be justified only on the grounds that it is politically or administratively feasible, whereas other programs are not. Furthermore, flood insurance should be carefully considered as an integral part of any program for coping with flood losses. Finally, land-enhancement benefits, when properly measured, represent real gains that should be incorporated in benefit estimates.

Lord, William B. (1994). Flood hazard delineation: The one-percent standard. *Water Resources Update*, 95(Spring), 36-9.
Keywords:
hundred-year flood standard, Special Flood Hazard Areas, mapping
Abstract: This article examines the NFIP's one-percent standard. This standard, which describes an area with a one-percent probability of flood occurrence in any year, was established as the standard for defining Special Flood Hazard Areas (SFHAs) on FIRMs. The standard was useful for encouraging both community floodplain delineation studies and enrollment in the regular program. However, now that 85 percent of flood-prone communities are participating in the NFIP, the standard has become an obstacle to informed and efficient floodplain management programs. What was intended to be a politically acceptable minimum standard of protection has too frequently become the only standard. Along with the abolition of this standard, the article makes several recommendations for hydrologic and topographic studies, improved zoning, and the distinction between existing structures in the floodplain from prospective development in hazard zones.

Lowry, G. Kem, Jr. (1980). Policy-relevant assessment of coastal zone management programs. *Coastal Zone Management Journal*, 8(3), 227-55.
Keywords:
coastal areas, public policy
Abstract: This policy evaluation provides information about the development, alteration, or termination of coastal zone management programs. Such evaluation should involve the analysis of the extent to which an organization's goals have been achieved. In policy evaluation, the critical design issue is to anticipate the policy context in which the evaluative information will be used. Anticipating the policy context involves responding to several questions. Who will make policy decisions in regard to coastal zone management programs? What policy decisions need to be made? Do policy-makers require evaluative information to make these decisions? What types of evaluative information do they need? Can this information be provided in time to be used in the decision-making process? No single evaluative approach is likely to be appropriate for all situations because of the number of potential clients for such information and the variety of decisions that have to be made. Five general approaches are outlined: program logic, compliance, process, goal achievement, and impact assessment. The choice of a particular approach depends primarily on the issues faced by policy-makers. The choice of research design for policy-relevant evaluations of coastal zone management programs is affected by a host of factors. Two

considerations are likely to be paramount, what types of policy decisions will the evaluations be used for? What are the stakes involved in the decision? The design and conduct of evaluative studies of coastal zone managements pose special problems. The causal analysis of the relationships among program interventions and coastal environmental conditions illustrates the research design problem. There are countless confounding factors that contribute to impacts on coastal resources. These factors represent rival explanations that can contribute to changing coastal conditions along with or instead of the program interventions. The ideal research design allows an evaluator to separate out spurious effects for true effects of the program intervention.

Luloff, A.E. and K.P. Wilkinson. (1979). Participation in the National Flood Insurance Program: A study of community activeness (sociological perspective). ***Rural Sociology*****, 44, 137-52.**

Keywords:
economic modeling, Pennsylvania, compliance, NFIP, socioeconomic impacts

Abstract: This study analyzes the NFIP from a sociological perspective. The research identifies those factors that influence the adoption of flood insurance regulations by studying all flood-prone municipalities in Pennsylvania. The study places emphasis on a community's structural characteristics, typical patterns of response to previous issues, and past history with flooding. Through the use of multivariate analysis, the authors generate support for the utility of the field perspective of community action as an approach to the study of action. The study concludes with an interpretation and possible implementation of the findings.

Lyons, Joseph K. and Robert L. Beschta. (1983). Land use, floods, and channel changes: Upper Middle Fork Willamette River, Oregon (1936-1980). ***Water Resources Research*****, 19(2), 163-71.**

Keywords:
development, modeling, Oregon

Abstract: Flow trends and channel characteristics from 1936 to 1980 were evaluated for the Middle Fork of the Willamette River, which drains a 668-km^2 forested watershed in the Cascade Mountains of western Oregon. An inventory of aerial photographs from 1959 to 1972 shows that landslides associated with roads and in clearcuts were 27 and 23 times more frequent, respectively, than in forested areas. Numerous landslides unloaded sediments directly into the drainage system; most landslides appear to have been initiated during a large flood (return period greater than or equal to 100 years) of December 22, 1964. Analysis of precipitation and peak flows (greater than 100 $m^3 s^{-1}$) from 1958 to 1980 by means of power function models suggests a trend of increasing flows as timber harvesting and road building expanded in the basin. Changes in channel pattern, documented from aerial photographs, show major increases in channel width from 1959 to 1967 and a trend of decreasing width from 1967 to 1980. During summer low flows in 1979 and 1980, 65 cross sections of the channel were surveyed to provide detailed measurements of existing channel conditions. Channel widths of 62 percent of the aggraded reaches were significantly greater ($\chi = 0.05$) than those for nonaggraded reaches.

MacDonald, Don M., James C. Murdoch, and Harry L. White. (1987). Uncertain hazards, insurance, and consumer choice: Evidence from housing markets. ***Land Economics*****, 63(4), 361-71.**

Keywords:

economic modeling, insurance premiums, housing markets
Abstract: This paper extends the option-price literature on uncertain housing characteristics to include insurance. The theoretical model predicts a relationship between housing price differentials and insurance premiums for housing located inside and outside of a hazard zone. The relationship is dependent on the consumer's perception of the loss from hazard relative to reimbursement from an insurance company. The theory provides an exogenous test (the insurance premium) for using the hedonic method to measure willingness to pay for housing. The theory is tested using housing data inside and outside a flood hazard zone.

MacDonald, Gordon J. (2000). *A Note on Order Statistics and Property Losses from Catastrophic Hurricanes and Floods in the USA*. Laxenburg, Austria: International Institute for Applied Systems Analysis.
Keywords:
Florida, hurricanes, Hurricane Andrew, Alabama, economic impacts
Abstract: The relative short time scale and limited spatial scales of hurricanes allow a normalization of damages at the present time. The most damaging hurricane in the period 1925-1995 was one that hit South Florida and the Alabama coast in 1926, following a path north of that followed by Hurricane Andrew in 1992. The normalized losses from the 1926 hurricane totaled $72 billion compared to the normalized $33 billion caused by Andrew. The most probable loss for a hurricane causing a loss greater than the 1926 hurricane is $152 billion. In constant current dollars, the average yearly loss from flooding in the United States is $3.1 billion while losses exceeded $4 billion in 25 years. The largest yearly flood-related loss was from the Midwest floods of 1993, which caused a loss of $19.5 billion. The most probable value for yearly losses greater than that of 1993 is $32 billion.

Maine Floodplain Management Program. (2002). *Maine Floodplain Management Handbook*. Augusta, ME: State Planning Office.
Keywords:
Maine, NFIP, floodplain management, mitigation, compliance, enforcement, development, mapping, substantial damage, substantial improvement, variances, Community Rating System, Flood Mitigation Assistance Program, Hazard Mitigation Grant Program, federal programs
Abstract: Maine's Floodplain Management Program provides information for communities interested in joining the NFIP, participating communities, homeowners, realtors and others in the form of technical information, floodplain maps, model ordinances, and workshops. Additionally, the floodplain management program reviews local ordinances for compliance with the NFIP. The handbook explains the NFIP's floodplain regulations to those responsible for floodplain management in Maine. Chapter topics include model floodplain ordinances, floodplain data, activities regulated, preventing increased damages (the floodway and hazardous materials storage), protecting structures from flood damage, administrative procedures, and related important information (including the Community Rating System and FEMA's Emergency Management Institute). Appendices include technical information, related publications and videos, floodplain management articles, the biennial report, and a glossary of terms.

Maloney, Frank E. and Dennis C. Dambly. (1976). The National Flood Insurance Program: A model ordinance for implementation of its land management criteria. *National Resources Journal*, 16(3), 665-736.

Keywords:
compliance, mandatory purchase, NFIP, takings
Abstract: After passage of the Flood Disaster Protection Act in 1973, property owners in communities participating in the NFIP were required to purchase flood insurance to be eligible for any new or additional federal or federally financed assistance for any construction located in areas identified by HUD as having special flood hazards. All identified flood-prone communities must enter the program within one year after formal notification that they contain special flood hazard areas in order to qualify their citizens. To enter the program, communities must adopt and submit required land use controls that govern floodplain management and apply to all areas identified as flood plain areas having special flood hazards. However, such land use controls are not self-executing, they require the enactment of local ordinances for their implementation. This article offers a model ordinance by which communities can use as an example to craft their own legislation. In addition, the article offers background for better understanding the 1973 Act and the history of the NFIP. An analysis of the NFIP in its present form follows. Part three discusses the problem of regulation under the Flood Disaster Protection Act and whether implementing state and local legislation constitutes a taking of regulated property in violation of state and federal constitutional provisions. Finally, part four offers the model ordinance with commentary including citations of sources from which the various provisions of the model were developed.

Mantese, Theresamarie and Gerard Mantese. (1993). Lender liability and flood insurance. *Journal of the Missouri Bar*, 207-13.
Keywords:
lending institutions, mandatory purchase, legal issues and litigation, liability
Abstract: Most real estate transactions involving a commercial lender include the lender's determination of whether flood insurance is required for loan approval. Even if flood insurance is not required, standard loan documentation usually specifies the costs for flood insurance. This article examines the status of law on the issue of lender liability for failure to determine accurately whether a property requires flood insurance. The Fourth, Fifth, Seventh, and Eighth US Circuit Courts of Appeals have held the National Flood Insurance Act (the Act) does not provide an express or implied federal statutory cause of action against a lending institution for violations of the Act. Yet, while federal courts have been unwilling to imply a private cause of action against lenders under federal law, they have not precluded lender liability under state common law. Some state courts have upheld the right of plaintiffs to file suit against a lender for failing to require flood insurance while others have refused to impose liability on the lender on the basis of principles of federalism. Based on actions in federal and state courts, a mere violation of the federal statutes will probably not create liability on the part of the lender for failing to require flood insurance or to notify the home purchaser of the presence of a floodplain. Thus, a client would be well-advised to insist on a flood letter in every real estate transaction.

Marchand, M., K.V. Heynert, H. van der Most, and W.E. Penning. (2003). *Dealing with Flood Risk*. Delft, The Netherlands: Delft University Press.
Keywords:
risk perception, floodplain management, flood disaster planning, insurance, Bangladesh, England, Netherlands, Germany
Abstract: This book discusses the implementation of risk perception and floodplain management in a post-modern world. The papers feature examples of new approaches to managing flood risks

in the United Kingdom, the Netherlands, Germany, and Bangladesh. Most important, the book tries to answer questions concerning (1) the role of technical, socioeconomic, and cultural conditions in science and policymaking; (2) the tools and methods necessary for effective risk and floodplain management; and (3) the implementation of general concepts and ideas at the regional and local levels.

Marincioni, Fausto. (2001). A cross-cultural analysis of natural disaster response: The northwest Italy floods of 1994 compared to the U.S. Midwest floods of 1993. *International Journal of Mass Emergencies and Disasters*, 19(2) 209-36.
Keywords:
Italy, Midwest floods of 1993, socioeconomic impacts, awareness
Abstract: The observation that similar types of natural disasters produce different reactions based on a particular culture and location demands a thorough and detailed analysis because the reasons are likely to be numerous and complex. Although the economic situation, political organization, and technological infrastructure of communities are fundamental factors, they do not offer a complete explanation of people's behavior in the face of risk and disasters. This article uses a cross-cultural perspective to clarify the relationship between two cultures and their different patterns of response to extreme flood events. The research was carried out in the United States and Italy, both of which have similar socioeconomic characteristics, but distinctly different historical and cultural traditions. The disasters studied were the Po River Valley floods of November 1994 in northwest Italy and the Mississippi River-Missouri River floods in the upper Midwest of the US during the summer of 1993. These two extreme floods were analyzed with respect to the pattern of human response during the preparation, rescue, recovery, and reconstruction phases. The study includes both human-response and cross-cultural analyses. A questionnaire was employed to gauge the perception of the flood disasters by the Italian and American disaster managers. The cross-cultural analysis was performed using an etic-emic contrast. The results show that the different human responses observed in the floods of northwestern Italy and of the United States Midwest were linked to basic differences in four cultural elements: (1) experience with floods, (2) sociopolitical traditions and organization, (3) level of integration within the community, and (4) perception of the physical environment.

Marlowe, Howard. (2000). Coastal dwellers not to blame. *USA Today*, July 27.
Keywords:
erosion, beach nourishment, coastal areas, subsidies, environmental restoration
Abstract: The president of the American Coastal Coalition states that beach erosion is not due to homes built near the coast but to the development of ports, inland waterways, and dams that interfere with the natural flow of sand. He questions the allegation that coastal property owners are subsidized by the rest of the nation, noting that NFIP premiums paid by residents of coastal states exceed their claims, and that funds spent to restore and protect coastal America pay off handsomely for all Americans. While unchecked erosion can leave coastal communities more prone to damage caused by storm surges, studies such as a National Research Council report from 1995 show that erosion is controllable by cost-effective, environmentally benign measures such as beach renourishment.

May, Peter J. (1985). *Recovering from Catastrophes: Federal Disaster Relief Policy and Politics*. Westport, CT: Greenwood Press.

Keywords:
disaster assistance, federal programs, legislation
Abstract: This book examines the evolution of disaster relief policy, assesses problems with the current policy, and provides an understanding of the issues that are likely to be involved in future deliberations about federal policy. Three interrelated aspects of the history and politics of disaster relief are examined in the book. The first is legislative history, involving considerable change in disaster relief legislation, congressional politics, and normative aspects of the federal role in providing assistance. A second aspect of the history of disaster relief policy examined is organizational history, as it mainly relates to repeated internal reorganizations of the disaster relief function in the executive branch. Finally, there is the history of what actually happened in the field in the aftermath of disasters concerning relationships among federal, state, and local officials. The book analyzes the way in which negotiations over disaster-specific relief provisions shape overall policy.

Mayer, David, Elizabeth Mayer, and Judith Mayer. (1984). Comparing costs of alternative flood hazard mitigation plans: The case of Soldiers Grove, Wisconsin. *Journal of the American Planning Association*, 50, 22-35.
Keywords:
relocation, Wisconsin, mitigation
Abstract: The authors compared the cost of relocating the business district of Soldiers Grove, WI, from its original site with cost estimates for raising traditional flood protection structures. The authors concluded that the town's choice (relocation) was the correct one. The authors reached their conclusion, despite almost identical cost estimates for both alternatives, because of the implied modernization of the town and the environmental consequences that the traditional measures could have caused (these measures were coupled with a never-completed dam). The authors acknowledge that relocation may not be desirable or easy for larger communities.

McShane, John H. (1996). A watershed approach to flood hazard mitigation and resource protection: The President's floodplain management action plan. In *Proceedings from Watershed 96*, Baltimore, MD, June 8-12, 1996.
Available at http://www.epa.gov/OWOW/watershed/Proceed/mcshane.html
Keywords:
floodplain management, environmental restoration
Abstract: The author contends that until recently, federal policy encouraged and funded major flood-control projects, and thus contributed to the loss and degradation of resources from the nation's floodplain. However in recent years, floodplain lands and waters have been recognized as ecologically productive, hydrologically important, and environmentally sensitive. Following the Midwest floods of 1993, the Federal Interagency Floodplain Management Task Force revised the Unified National Program for Floodplain Management to reflect the increased recognition of the importance of protecting and restoring the natural resources and functions of floodplains, as well as reducing the loss of life and property caused by floods. During that same time, the Executive Office of the President established the Floodplain Management Review Committee. The Committee prepared a report, *Sharing the Challenge: Floodplain Management Into the 21st Century*, which reinforced the findings of the Task Force. The author affirms his support for a *Floodplain Management Action Plan* for the nation.

Michigan Department of Environmental Quality, Land Water Management Division. (1999). *Floodplain Management for Local Officials with Related Regulations including the National Flood Insurance Program*. Lansing, MI: Michigan Department of Environmental Quality.

Keywords:
Michigan, NFIP, floodplain management, mitigation, compliance, enforcement, building codes, development, mapping, substantial improvement, substantial damage, variances, Community Rating System, federal programs

Abstract: Successful floodplain management depends on proper building construction in areas subject to flooding. This handbook is a tool for building inspectors, zoning administrators, and other floodplain managers to help guide construction in flood-prone areas and to meet the requirements of the NFIP, Michigan statutes, and local zoning and building codes. Chapter topics include building codes and permit coordination, plan review for the reduction of flood hazards, building inspectors' duties, flood-hazard construction techniques, developments requiring special attention, variance criteria of the NFIP, the Community Rating System, and making changes in flood hazard maps.

Mileti, Dennis S. (1995). Factors related to flood warning response. Paper presented at the *United States-Italy Research Workshop on the Hydrometeorology, Impacts, and Management of Extreme Floods*, Perugia, Italy, November 13-17, 1995.

Keywords:
risk communication, awareness

Abstract: This paper synthesizes the social psychological process that explains how members of the public receive, process, and eventually come to take protective actions in response to the receipt of warnings of extreme floods. The author argues that effective public warnings must provide for public interaction and foster the search for information in addition to received warnings. Furthermore, according to the author, communicating risk to the public is an almost continual process when viewed globally.

Mileti, Dennis S. (1999). *Disaster by Design*. Washington, DC: National Academy of Sciences, Joseph Henry Press.

Available at: http://books.nap.edu/books/0309063604/html/5.html#pagetop

Keywords:
mitigation, public policy

Abstract: *Disaster by Design* is aimed at a general audience, including policymakers and practitioners. It synthesizes statements about hazards and human coping strategies. This book stemmed from the second national assessment on natural and related technological hazards and disasters and it contends that many disaster losses are the predictable result of interactions among three major systems: the physical environment; the social and demographic environments; and the buildings, roads, bridges, and other components of the constructed environment. Settlement of hazardous areas has destroyed local ecosystems that could have provided protection from floods and other natural perils (e.g., the draining of swamps in Florida). Furthermore, mitigation efforts themselves can degrade the environment and contribute to the next disaster (e.g., levees built to provide flood protection can destroy riparian habitat and heighten downstream floods) and some efforts to head off damages from natural hazards only postpone them (e.g., dams or levees). The book suggests six objectives for sustainable mitigation of hazard risks: (a) maintain

and enhance environmental quality, (b) maintain and enhance people's quality of life, (c) foster local resiliency and responsibility, (d) recognize that vibrant local economies are essential, (e) ensure inter- and intra-generational equity, and (f) adopt local consensus building. The book concludes that in order to support sustainable hazard mitigation, researchers and practitioners need to ask new questions as well as continue to investigate traditional topics. Important efforts will include interdisciplinary research and education, and the development of local hazard assessments, computer-generated decision-making aids, and holistic government policies. Future work must also focus on techniques for enlisting public and governmental support for making sustainable hazard mitigation a fundamental social value. Members of the hazards community will play a critical role in initiating the urgently needed nationwide conversation on attaining that goal.

Millemann, Beth. (1993). The National Flood Insurance Program. *Oceanus,* 36, 6-8.
Keywords:
development, liability, NFIP
Abstract: The author forecasts that the NFIP is going to be one of the biggest domestic liabilities in the United States. Scientists at the National Hurricane Center predict that another storm cycle of "super hurricanes" would mean claims of $3.5 billion to $4 billion. The National Flood Insurance Fund has less than $400 million, so any shortfall would have to be paid by the federal taxpayer. The author claims that the NFIP was originally intended to discourage overdevelopment of coastal areas, but it resulted in an explosion of coastal development in the 1970s and 1980s. Congress attempted to overhaul the NFIP in 1992 but, according to the author, a coalition of powerful interest groups fought against it, and the legislation did not pass.

Miller, B.A., A. Whitlock, and R.C. Hughes. (1996). Flood management: The TVA experience. *Water International,* 21(3), 119-30.
Keywords:
floodplain management, Tennessee Valley Authority, structural approaches, nonstructural approaches, agency operations and management
Abstract: Increasing attention has been focused on the need for a more comprehensive approach to flood management that combines traditional structural approaches with elements of nonstructural floodplain management. For the past 50 years, the Tennessee Valley Authority (TVA) has met its responsibilities for flood control in the Tennessee River Basin through such a dual approach, combining a system of multipurpose dams and reservoirs with a floodplain management program to encourage appropriate shoreline development. This article provides an overview of TVA's floodplain management program including a description of the hydrologic conditions in the region, an overview of the reservoir system and its flood control capabilities, and a description of forecasting procedures and flood control operating strategy. The development and implementation of TVA's floodplain management program, and its role in reducing flood damages in the Tennessee Valley are also presented. The article closes with a discussion of the role of technological advances and agency streamlining of future operations.

Miller, H. Crane. (1975). *The National Flood Insurance Program and Coastal Real Estate Development: The Experience of Westerly, Charlestown, and South Kingstown, Rhode Island, 1975*. Putnam, CT: Cheney, Miller, Ellis and Associates, Inc.
Keywords:

development, Rhode Island, coastal areas
Abstract: The predominant force influencing sales and development of beach properties in Westerly, Charlestown, and South Kingston, RI, is the availability of direct financing of such properties as a result of the availability of flood insurance. Bankers and realtors agree that the availability of flood insurance has created a broader base of property owners, particularly among middle income individuals who can now afford beach properties because of direct financing available up to 70 percent of the property value. There is a definite cause-and-effect relationship between flood insurance and available direct financing and a less definite relationship between accelerated sales and flood insurance. The low cost of flood insurance is both affordable and negligible when compared with the risks involved and the protection afforded property owners. Flood insurance premiums in the early 1970s did not act as economic disincentives to development on the barrier beaches of the three towns.

Miller, H. Crane. (1975). Coastal floodplain management and the National Flood Insurance Program: A case study of three Rhode Island communities. *Environmental Comment,* 3(2), 2-14.
Keywords:
coastal areas, development, floodplain management, Rhode Island
Abstract: In this study of three communities, the author says that local banks voluntarily withdrew from the first mortgage market due to hurricane destruction in 1938 and 1954. Building, however, continued during this period since homeowners were able to get mortgages from lenders outside the local market. Once flood insurance was available to secure mortgages, however, local banks again began to issue mortgages on ocean front property. Because the demand for coastal property was high before enactment of the NFIP, the author argues that there was no clear evidence that the availability of flood insurance increased that demand. The author claims that most property owners in the area perceive flood insurance as a bonus. The author contends that some evidence implies the availability of flood insurance in coastal areas may work as a counter force against sound coastal management, by sustaining and even increasing property values.

Miller, H. Crane. (1977/1981). *Coastal Flood Hazards and the National Flood Insurance Program*. Washington, DC: FIA.
Keywords:
development, Rhode Island, property values
Abstract: This research was an attempt to test whether the findings in Miller's 1975 study of Rhode Island could be applied to the nation as a whole. The author chronicled a tremendous growth in coastal development in the 1960s and 1970s but the demand generally existed before the NFIP. The author concludes that: (a) adding the cost of insurance premiums to the property apparently neither increases nor decreases demand for coastal properties; (b) there was no evidence that floodplain management requirements on coastal development depressed demand for coastal property; (c) the greatest effect on property values during this period wasn't the NFIP but rather market forces; and (d) in most coastal communities, the NFIP had not affected the basic investment decision on availability of financing.

Miller, H. Crane. (1983). Shifting sands of coastal barrier development subsidies. In *Preventing Coastal Flood Disasters: The Role of the States and Federal Response*. Madison,

WI: Natural Hazards Research and Applications Information Center and Association of State Floodplain Managers.
Keywords:
development, coastal areas, subsidies
Abstract: The author contends that federal subsidies for infrastructure and disaster assistance have played a significant role in coastal development since the end of the Korean War. In most cases, according to the author, flood insurance was not the main force behind such development. Subsidies for bridge access, roads, water supplies, water treatment, and wastewater treatment had a more profound impact on development.

Miller, H. Crane. (1990). ***On the Brink: Coastal Location and Relocation Choices.*** **Washington, DC: FEMA.**
Keywords:
relocation, Upton-Jones Amendment, coastal areas, awareness, attitudes
Abstract: The author uses data from two coastal communities to explain why the relocation provisions of the Upton-Jones Amendment are used infrequently. Interviews and other analysis of the two communities led him to conclude that owners generally buy oceanfront property with knowledge of the risk and of the history of storms and other hazards in the area. People buy on the oceanfront because they "want to be there," find their risk acceptable, and often would locate there regardless of whether flood and wind insurance were available. Besides, coastal property owners are far more likely than their riverine counterparts to rebuild in the same location if a disaster destroys their home. Each of the owners that Miller interviewed carried high amounts of flood, wind, and homeowners insurance. All said they realized they might lose their investment to erosion but felt the possibility a small one. Retreating from the water's edge, even with some government subsidy, was not economical for most of the owners since they enjoyed a good secondary income by renting the ocean front property to seasonal visitors. For many, rental incomes, even when offset with the cost of insurance and repairs, made the property a good personal investment. The amenities of an oceanfront location—view, beach access, water recreation, nearby wetlands, and general peace and quiet—seem to meet deeply felt emotional needs of people who own property there.

Miller, John B. (1998). ***Floods People at Risk: Strategies for Prevention*****. Collingdale, PA: DIANE Publishing Company.**
Keywords:
floodplain management, mitigation, Midwest floods of 1993
Abstract: This book draws on recent case examples and aims to provide authoritative scientific and technical information. It includes flood statistics; information on the Midwest floods of 1993; causes of floods; floodplain management, strategies for reducing loss of life and property; floodplain mapping; flood insurance; structural counter measures (e.g., dikes, flood control reservoirs, flood detention basins, and river training); nonstructural defenses (e.g., floodproofing, soil and water conservation, flood forecasting; and dam safety); and emergency responses (e.g., flood precautions, post-flood recovery, and post-flood review).

Minnesota Department of Public Safety. (2001). ***Minnesota Mitigation Success Stories.*** **St. Paul, MN: Minnesota Department of Public Safety, Division of Emergency Management.**
Keywords:

Minnesota, Hazard Mitigation Grant Program, mitigation, buyouts
Abstract: Since 1988, the Division of Emergency Management through FEMA's Hazard Mitigation Grant Program (HMGP) has committed more than $70 million to reduce future damages caused by natural disasters. This report explains some of the mitigation successes the state has recognized in recent years. Successes include a program to buyout flood-prone homes in Austin, an initiative to strengthen an electric cooperative against extreme weather in Mankato, and a project to create disaster-resistant manufactured homes in Owatonna.

Missouri State Emergency Management Agency. (1995). *Out of Harm's Way: Missouri's Flood Buyout Program.* Jefferson City, MO: Missouri State Emergency Management Agency.
Keywords:
buyouts, mitigation, Missouri, relocation
Abstract: This report illustrates the success of the Missouri Buyout Program (MBP) and offers sufficient in-depth background for a public policy debate on continued funding of such programs. The MBP is a proactive and cost-effective program that stresses a collaborative effort among federal, state, and local governments. It is a voluntary program, providing residents a practical solution by relocating homes outside of the floodplain. Once the properties are cleared, the publicly owned land may then be used for purposes more consistent with the threat of repeat flooding (e.g., open space). The following recommendations are included in the report: establish a buyout and hazard mitigation program with funding authorities independent of disaster declarations; maintain flexibility in hazard mitigation programs to promote cost-effective and appropriate mitigation techniques, include the option of states receiving funds as a block grant; and develop common procedures for federal buyout and mitigation programs.

Mittler, Elliott. (1996). Social consequences of flood mitigation. In *1996 International Conference and Exposition on Natural Disaster Reduction*. Washington, DC: American Society of Civil Engineering.
Keywords:
buyouts, cost-benefit analysis, structural approaches, mitigation, socioeconomic impacts
Abstract: The federal government has pursued both structural and nonstructural solutions to disastrous floods. The cost-benefit analyses that drive the choices of mitigation solutions, however, do not fully account for the social impacts of each decision. The NFIP's buyout plan aims to remove at-risk structures within the floodplain, but the social consequences of this plan have not been studied. Consequences may include changes to the core urban structure, loss of farmlands, and loss of passive recreation areas. Ultimately, these decisions favor those with money over those without. Even voluntary buyouts give the property owner poor choices: move out of one's home or stay and have the surrounding areas gradually reduced in economic and social value. This disproportionately affects those already living on the economic margin.

Mittler, Elliott. (1997). *An Assessment of Floodplain Management in Georgia's Flint River Basin*. Program on Environment and Behavior Monograph #59. Boulder, CO: Institute of Behavioral Science, University of Colorado.
Keywords:
building codes, Flint River Basin, Georgia, relocation, buyouts, awareness, substantial damage

Abstract: This book, based on research funded by the FEMA and ASFPM, assesses federal, state, and local flood loss reduction efforts in the context of Georgia's floods of 1994. The study finds that federal, state, and local governments worked successfully at implementing policies and programs to reduce future flood losses. Reasons for the positive outcome include the implementation and enforcement of preexisting federal recovery and mitigation policies; Georgia's adoption of the federal policies as the main elements in its recovery plan and subsequent efforts to establish state guidelines for acceptable local recovery plans; and the state's provision of trained local building inspectors to ensure the implementation and enforcement of state building codes. The book makes several other findings. First, FEMA's buyout and relocation policy is too limited and inflexible to accommodate complex local issues like those that arose in Albany, GA, such as a failure to coordinate local and regional programs and a flawed method for determining buildings that were substantially damaged. Second, flood insurance was not widely purchased by property owners in the Flint River Basin. Those who purchased coverage tended to be underinsured, and disaster assistance was the primary source of federal funds to individual victims. Third, federal, state, and local officials made sub-optimal decisions because they did not share important data or effectively use data collected by others.

Montz, Burrell E. (1983). The effects and effectiveness of flood insurance requirements: Agent perspectives. *The Environmental Professional*, 5, 116-23.
Keywords:
development, property values, housing markets
Abstract: The author asked a local sample of diffusion agents (defined as mortgage lenders, real estate agents, and property insurance agents) a variety of questions about their interaction with consumers who had purchased or were considering purchasing property in flood hazard areas. One of the questions was whether the agents felt the NFIP and local floodplain regulations made a difference in the demand for land in the floodplain. Generally, those who responded felt there was little or no effect of the NFIP on the local housing market. In other words, it neither decreased nor increased demand. They reported that when consumers first learned that a piece of property was in the hazard area, it seemed to concern them but ultimately did not deter them from their purchase decision. The extent to which their decision to purchase was related to the comfort afforded by insurance availability is not clear from these findings.

Montz, Burrell E. (1987). Floodplain delineation and housing submarkets: Two case studies. *Professional Geographer*, 39(1), 59-61.
Keywords:
New York, Pennsylvania, floodplain designation, housing markets
Abstract: This study presents the effect of floodplain designation on the residential real estate market in Elmira, NY, and Wilkes-Barre, PA. Discriminant analysis differentiates between floodplain and nonfloodplain housing, using as independent variables characteristics of the houses sold. Several variables define submarkets, but they vary between the communities. Only selling price and lot size were significant for both communities. Distinct floodplain and nonfloodplain housing markets can be differentiated. This allows for isolation of socioeconomic and environmental variables that can contribute to the recovery of housing values following flooding or to the implementation of land-use controls associated with floodplain designation.

Montz, Burrell and Eve C. Gruntfest. (1986). Changes in American urban floodplain occupancy since 1958: The experiences of nine cities. *Applied Geography,* 6, 325-38.
Keywords:
compliance, development, floodplain management, urban areas
Abstract: In 1958, researchers from the University of Chicago documented increases in the number of structures in the floodplains of 17 American cities, a phenomenon attributed to the prevalence of flood control structures. Because federal policies have shifted to managing floodplains, this paper updates the 1958 study for nine of the cities. Several trends are apparent. Development pressures determine floodplain encroachment; floodplain management regulations have been implemented where it was easiest to do so. Further, structural measures continue to dominate. Thus, while many local officials are becoming more aware of advantages of floodplain regulation, implementation and enforcement are inconsistent and uneven.

Montz, Burrell E. and Graham A. Tobin. (1988). The spatial and temporal variability of residential real estate values in response to flooding. *Disasters,* 12(4), 345-55.
Keywords:
economic modeling, property values, California, housing markets
Abstract: A case study of two communities in California that flooded following a levee break represents a relationship between residential property values and the incidence of flooding. Analysis of the real estate market before and after the flood shows that the flood was capitalized into housing values, whereby both list and selling prices dropped immediately but have recently begun to recover. However, recovery of the market is not uniform throughout the floodplain. Houses that suffered from 18 inches of water recovered to near preflood values in less than one year. In contrast, houses that had approximately ten feet of water in them have not recovered to the same extent, indicating that capitalization and recovery do not occur evenly. These findings suggest that policies and programs should address these spatial and temporal differences in recovery, which are expected to vary with different flood frequencies and magnitudes.

Montz, Burrell E. and Graham A. Tobin. (1999). The Effectiveness of the National Flood Insurance Program in Two Communities: Syracuse, NY, and Tampa, FL. Paper presented at the *Annual Meeting of the Association of State Floodplain Managers,* Portland, OR, May 24-28, 1999.
Keywords:
cost-benefit analysis, development, New York, Florida, property values, NFIP
Abstract: This study is based on a research design developed by Newton, Myers, and Monday (1996), which posed three questions related to floodplain activities over the last 30 years: (a) What has been the NFIP's effect on human occupancy of floodplains?, (b) What has been the effect of the NFIP on net economic value of floodplain occupancy?, and (c) What has been the NFIP's effect on the natural functions of watersheds? This two-city pilot project was aimed at obtaining a preliminary view of the impacts of NFIP and at refining a methodology for a broader national assessment. The results reported focus on the first two questions. The results suggest differences in occupancy and economic value of floodplain and nonfloodplain areas since communities joined the NFIP. Some differences can be attributed to economic and demographic characteristics, but others cannot. With all but multiple-family residences, there is a tendency toward decreased investment in floodplains, but patterns differ between the two cities. In Syracuse, a decrease in the number of structures was evident, except with multiple family

residences. In Tampa, there were increases in all floodplain land uses, but the absolute change in number of structures was higher in the nonfloodplain area. Thus, even with growth, there is a tendency toward less economic activity in the floodplain. The timing of this differs between cities. In Syracuse, joining the NFIP coincided with a decrease in the number of structures, whereas in Tampa, the greatest increase in number of structures in the floodplain occurred at this time. While these changes could have come about before entrance into the NFIP, the pace of investment decreased in the floodplain as community experience with the NFIP increased, and this differs from nonfloodplain areas. It is clear, therefore, that these results are not removed from other forces that affect investment in development. In Syracuse, the study period includes times of economic downturn; decreases in the number of structures could be attributable to that condition. However, if that were the case, the differences between floodplain and nonfloodplain areas would probably not exist. It appears that the NFIP is making a difference, irrespective of the socioeconomic characteristics of communities.

Moore, Jamie W. and Dorothy P. Moore. (1989). *The Army Corps of Engineers and the Evolution of Federal Flood Plain Management Policy*. Boulder, CO: Institute of Behavioral Science, University of Colorado.

Keywords:
floodplain management, Army Corps of Engineers, federal programs

Abstract: This study examines the relationship between the Army Corps of Engineers and the development of federal programs of floodplain management. While the narrative primarily focuses on the Corps, any study of floodplain management must embrace many subjects. The decisive players in the theory and practice of flood damage abatement include the evolution of associated engineering technologies; political, social, and economic impacts on the enactment of legislation; the workings of the political process; the organizational impulses directing agency decisions and practices; and changes in public opinion.

Moore, Martha T. (1998) Line in the sand over beach rebuilding. *USA Today*, May 22.

Keywords:
development, beach nourishment, Army Corps of Engineers, erosion

Abstract: Coastal states and towns say that beach replenishment is vital to attract tourists, to protect coastal property from storms, and to drive economies. Environmentalists, however, oppose beach replenishment, saying it does not last, is environmentally questionable, and is bad fiscal policy. The federal government, which pays for 65 percent of beach replenishment through the Army Corps of Engineers, wants to cut back. Opponents of beach replenishment argue that federal subsidies should not pay to protect coastal properties. Environmentalists oppose building seawalls to protect beachfront property and building groins and jetties to try to hold beaches in place. They say the real villain in erosion is development and recommend moving buildings back from the oceanfront. Since 1965, an estimated $3.5 billion has been spent on beach replacements according to a study by Duke University's Program for the Study of Developed Shorelines. The Army Corps of Engineers cites much lower numbers but says it is spending $150 million a year on beach replacement. The Clinton Administration proposed cutting these funds in the Water Resources Development Act; it would pay for 65 percent of the initial cost but only 35 percent for the following 50 years of maintenance. With federal budget cuts, coastal communities would face tough decisions on whether they can or want to pay more of the bill. Local decisions in five states are described.

Morris, Marya. (1997). *Subdivision Design in Flood Hazard Areas*. Chicago, IL: American Planning Association.
Keywords:
development, floodplain management, zoning, alluvial fans, coastal areas, mitigation, environmental policy, public policy
Abstract: FEMA provided funding for this report and asked the American Planning Association (APA) to write and publish it as a form of outreach to the planning community. The report advocates an approach to residential subdivision design in flood hazard areas that uses the full range of available land-use planning techniques to reduce flood damages and minimize impacts on floodplains. It recognizes the dual goals of the Congress, FEMA, and many state and local governments to reduce the loss of life and property caused by floods and to protect and restore the natural resources of floodplains. Chapter 1 offers an overview of the environmental and policy context in which floodplain management and subdivision planning, regulation, and design takes place. It also describes the legal and constitutional framework for subdivision regulation and floodplain management. Chapter 2 addresses the natural functions of the floodplain and describes the range of tools that are available to protect these functions. Chapter 3 describes fundamental land-use planning activities—comprehensive planning, zoning, and subdivision control—and their relationship to floodplain management. It also describes other techniques that have been used to protect floodplains such as cluster development, transferable development rights, greenways, and setbacks. Finally, Chapter 4 provides a detailed description of site design and planning techniques to protect properties from flooding and to preserve the natural functions of floodplains. A design hierarchy is presented that recommends four approaches to subdivision development in or near floodplains. Additional detail on how NFIP requirements and CRS activities are related to land-use and site planning are also provided in Chapters 3 and 4.

Morris-Oswald, Monica and Slobodon P. Simonovic. (1997). *Assessment of the Social Impact of Flooding for Use in Flood Management in the Red River Basin*. Ottawa, ON, and Washington, DC: International Joint Commission.
Keywords:
Red River, Canada, Manitoba, socioeconomic impacts, disaster planning, risk communication, risk management
Abstract: Prepared at the request of the International Joint Commission's Red River Basin Task Force, this report aims to assess the problems encountered by individuals and communities in coping with the 1997 flood. The report also presents a series of recommendations on how to plan more effectively to reduce human hardship in subsequent floods. Victims themselves provided information for the report. Fifty-four victims participated in interviews in several different communities both within Winnipeg and in surrounding rural areas. Interviewees answered questions on how the flood impacted them, their families, and their communities. In addition to a wide range of closed questions, many open-ended questions asked during the interviews permitted victims to better describe their perceptions and experiences. The authors analyzed qualitative and quantitative data from the interviews to identify the most prevalent and serious problems faced by victims. Based on the analysis, the report makes the following recommendations: develop a public information system using state-of-the-art technology, develop a comprehensive flood management plan involving all levels of government and local communities, improve flood warning and evacuation systems, identify local communities'

resource requirements and develop mobilization plans to get resources, and reorganize the claims process of the (Manitoba) Emergency Measures Organization.

Mrazik, Brian R. (1987). Flood risk analysis for the National Flood Insurance Program, Application of frequency and risk in water resources. In *Proceedings of the International Symposium on Flood Frequency and Risk Analysis.*
Keywords:
floodplain management, mapping, modeling, risk assessment
Abstract: Flood frequency and risk analysis play a fundamental role in the insurance, floodplain management, and hazard mapping aspects of the NFIP. The analytic procedures commonly utilized in flood insurance studies of riverine floodplains include flood frequency analysis for gaged and ungaged streams and stage-frequency determinations. Coastal flood insurance studies include synthetic storm surge modeling, statistical analyses, and wave analyses. Consistency in flood frequency estimates over both time and space is needed to effectively administer the NFIP at the national and local levels. Enhanced capability in risk analysis for ice jams, erosion, levee failure, shifting channels, long-term lake level fluctuations, and mudflows is also needed to support the program's operations in these specialized hazard environments.

Mrazik, Brian R. and Harriette A. Kinberg. (1991). National Flood Insurance Program—Twenty years of progress toward decreasing nationwide flood losses. In *National Water Summary 1988-89—Hydrologic Events and Floods and Droughts*. Reston, VA: US Geological Survey.
Keywords:
NFIP
Abstract: This article presents an historical perspective on federal involvement with flood control and discusses basic concepts of the NFIP including its objectives, community participation and mitigation, flood hazard identification and risk assessment, the availability of insurance, and future directions for the program. Aside from conventional information on the program's operations, the article notes some current assessments undertaken by FEMA including a major effort to evaluate the effectiveness of floodplain management standards. According to the agency, experience as of the end of FY 1987 indicates the adequacy of the NFIP's minimal building standards. Plans for future activities include increased monitoring of community compliance with minimum criteria of the floodplain management program, integration of geographic information systems (GIS) into mapping techniques, creation of new products and services for users of flood-hazard data, and improved capabilities to analyze unique flood-related hazards. Finally, the article describes a framework for a community rating system.

Muckleston, Keith W. (1983). The impact of floodplain regulations on residential land values in Oregon. *Water Resources Bulletin*, 19, 1-7.
Keywords:
development, mitigation, Oregon, property values
Abstract: Ambiguities about the relationship between floodplain regulations and residential land values in Oregon were investigated. Clarification of this relationship should facilitate the long-delayed implementation of a more comprehensive and successful approach to flood hazard mitigation than is presently employed. The suggestion that current floodplain regulations significantly depress appreciation rates of regulated lands relative to those of similar unregulated

lands was rejected in most cases. When this suggestion was accepted, the circumstances rendered the conclusions tenuous. Problems and issues facing this type of research are presented in case studies of two of the research study areas. However, conclusions should remain tentative because the research could not be carried out under ideal conditions. The criteria for establishing uniform study areas could not be fully met, even though much attention was paid to this step in the research process. One problem is that considerable development had taken place in some of the study areas prior to the implementation of floodplain regulations. Under these conditions, a valid question regarding the relation between regulation and land values appears to be whether any possible negative aspects of land-use regulations are not outweighed by the positive attributes of flood insurance, which becomes available concurrent with the local adoption of regulations.

Mueller, R.H. (1988). Feasibility of predicting 100-year floodway width and depth in the Tennessee Valley by multiple linear regression. In *Floodplain Harmony, 6.* Boulder, CO: Natural Hazards Research and Applications Information Center, Institute of Behavioral Science, University of Colorado.
Keywords:
modeling, Tennessee Valley Authority
Abstract: One of the most serious impediments to effective administration of local flood damage reduction programs cited by community officials and state NFIP coordinating agencies is the lack of detailed flood data (i.e., flood depth and floodway width). The Tennessee Valley Authority (TVA) is making an effort to develop equations for estimating flood depth and floodway width along natural, unobstructed stream reaches from common watershed characteristics using multiple linear regression. Results show that floodway width cannot be predicted with reasonable accuracy because of the inherent variability of floodway width along a given stream reach. The US Geological Survey (USGS) and several state agencies have had success developing regional equations for predicting 100-year flood depths. Depth regression equations adequately cover most of the Tennessee Valley. The inherent variability of floodway width discourages use of regional regression equations for predicting it. The need for an easy-to-use method for predicting floodway width remains.

Multihazard Mitigation Council of the National Institute of Building Sciences. (2002). *Parameters for an Independent Study to Assess the Future Benefits of Hazard Mitigation Activities.* Washington, DC: National Institute of Building Sciences.
Keywords:
coastal areas, cost-benefit analysis, economic impacts, economic modeling, hurricanes, mitigation, natural disasters, nonstructural approaches, public policy, relocation, risk assessment, riverine areas, structural approaches, wind
Abstract: This report establishes the parameters for a study, but does not include results from the study itself. Report 106-161 for the FY 2000 House Appropriations Committee, Subcommittee for the Veterans Administration, Department of Housing and Urban Development, and Independent Agencies mandated that FEMA “fund an independent study to assess the future savings resulting from various types of mitigation activities” to determine which mitigation activities actually lead to savings. FEMA gave the assignment of defining the parameters of the study to the Multihazard Mitigation Council (MMC) of the National Institute of Building Sciences. The MMC convened a panel of experts who conferred with a variety of stakeholders to set the parameters for the study. The panel proposes two studies on representative mitigation

activities and communities. Track A examines mitigation activities in varying contexts in a representative national sample of mitigation activities. Track B examines mitigation activities in specific community contexts in sample chosen to maximize variations in hazards and mitigation activities considered. In both studies empirical research will be used to examine savings resulting from the mitigation activities employed and will allow for generalizations to the nation as a whole.

Myers, Mary Fran and Gilbert F. White. (1993). The challenge of the Mississippi floods. *Environment,* 35(10), 6-9, 25-35.
Keywords:
Midwest floods of 1993, Mississippi River, floodplain management, levees
Abstract: This article discusses the federal government's participation in flood management since 1825; the flooding in the upper Mississippi and lower Missouri basins from mid June through early August 1993; the impact of the flood on urban and rural families; the dilemma of whether to repair or rebuild damaged buildings and levees; new recognition of the values of floodplain management; and the need to include the idea of mitigation in the disaster cycle of preparedness, response, and recovery. It questions why so many levees failed. Sidebars list recommendations for floodplain management and significant events in the development of US flood control policy. Charts depict the area's weather and water flow patterns and a table presents preliminary estimates of damage to levees in the Mississippi River Basin in 1993.

Nakaya, Hiroaki. (2000). *Policy Proposal: A Split for Unity.* Washington, DC: FEMA.
Keywords:
insurance premiums, mapping, subsidies, Base Flood Elevation, NFIP, pre-FIRM structures, post-FIRM structures
Abstract: This report analyzes the NFIP's operating results. It first attempts to correct a widespread misconception about the NFIP, namely, that FIA gives taxpayer money to flood victims. Second, statutory background is examined concerning the concepts of moral hazard and adverse selection. Moral hazard is inherent in any insurance, and therefore must be accepted as a matter of degree. Third, financial analysis shows that post-FIRM policyholders living below BFE have been overpaying and both pre-FIRM and post-FIRM policyholders living above BFE have been underpaying. Thus, the problem arises of an internal transfer, or premium subsidy, within the NFIP. Fourth, two implications from this internal transfer problem are discussed. One is that the map modernization project needs much more attention. The other is that the lowest floor elevation information for pre-FIRM properties must be attained to determine the policyholder's premium, thus taking potential losses from a catastrophic year into consideration and making this group of policyholders financially self-sufficient. Last, splitting NFIP policyholders into two groups, those with actuarially based policies and those with policies based on historical averages, is suggested. The split would set post-FIRM policyholders who are living below BFE free from the burden of overpaying premiums, and would more appropriately place this burden on those with historical average flood insurance, leading to a substantial premium hike. The only way out for those policyholders, under the participation requirement mentioned above, is to get elevation certificates, to conduct a thorough flood study, and to join actuarially based flood insurance. In the historical average method, people with less than average risk are forced to pay more than their fair share; by getting elevation certificates, they would move to an actuarially based program. This rationale leads to an elimination of historical average insurance and introduces

flood mitigation loans based on risk information. Without information on lowest floor elevation and major leverage for map modernization, flood-related programs cannot achieve their goals.

National Academy of Public Administration. (1999). *Legal Limits on Access to and Disclosure of Disaster Information – Summary Report*. Washington, DC: National Academy of Public Administration.
Keywords:
disaster planning, strategic planning, public policy, legal issues and litigation
Abstract: In November 1997, a high-level Disaster Information Task Force consisting of federal officials from several key agencies submitted to the vice president a report that recommended the federal government begin to create an electronic disaster information network for the nation that could become a leading component of a worldwide Global Disaster Information Network (GDIN). Under a cooperative agreement with the US Geological Survey, the National Academy of Public Administration undertook a preliminary analysis of certain legal limitations on access to and disclosure of disaster management data within the United States that will be important to consider in developing a national component of the GDIN. The legal limitations involve intellectual property, privacy, liability, and security concerns. This summary report presents the findings and recommendations of the analysis. For example, the Academy found that the current array of federal, state, and local laws, regulations, and practices that limit data access and disclosure is highly complex, and the many separate provisions are not always consistent and often conflict with each other. The Academy recommends that a disaster information network incorporate a set of general principles for data access and disclosure from the beginning.

National Academy of Sciences. (1977). *Methodology for Calculating Wave Action Effects Associated with Storm Surges*. Washington, DC: National Academy Press.
Keywords:
mapping, zoning, coastal areas
Abstract: This report discusses methods for the prediction of wave heights throughout the flood hazard areas of the Atlantic and Gulf Coasts. Methods are proposed for the estimation of wave heights at the shoreline during flood conditions in addition to methods for the estimation of wave dissipation and wave regeneration in coastal flood hazard areas. The methods presented in the report formed the basis for flood hazard mapping in V Zones and coastal A Zones.

National Academy of Sciences, Committee on Coastal Erosion Zone Management. (1989). *Managing Coastal Erosion through the National Flood Insurance Program*. Washington, DC: National Academy Press.
Keywords:
erosion, coastal areas, hazard identification
Abstract: In 1988, FIA asked the National Research Council (NRC) for advice on appropriate erosion management strategies, supporting data needs, and applicable methodologies to administer these strategies through the NFIP. This report details the NRC's conclusions and recommendations with respect to erosion hazard reduction, including: (a) hazard delineation, (b) recommended methodologies, (c) standards for development, (d) the impacts of navigational and flood control projects on shore stability, (e) erosion control through coastal engineering, (f) sand and gravel mining, and (g) subsidence. The report also includes recommendations for improving education, database development, and research. A key recommendation made in the report was

the identification of coastlines subject to coastal erosion (E Zones) for the purposes of hazard delineation and determination of federal insurance ratings.

National Association of Flood and Stormwater Management Agencies. (2000). ***NAFSMA Position on Floodplain Management Issues Related to the NFIP and FEMA's Administration of Same.*** **Washington, DC: National Association of Flood and Stormwater Management Agencies.**
Keywords:
Community Rating System, mapping, structural approaches
Abstract: The National Association of Flood and Stormwater Management Agencies' (NAFSMA) mission is to advocate public policies that facilitate the achievement of the public service functions of its member agencies. NAFSMA has identified the following areas of concern with regard to the NFIP and how FEMA is managing this program as it affects the public service functions of its member agencies. NAFSMA's concerns include: (a) mapping issues; (b) institutional bias against structural flood management projects; and (c) the Community Rating System. The member agencies of the NAFSMA want to work with FEMA on the common goal of protecting the lives and property of American citizens. NAFSMA would like FEMA to recognize the association's commitment, its expertise, and its unique circumstances. In addition, NAFSMA would like its work products to be more readily accepted by FEMA. To do otherwise is to waste precious resources.

National Committee on Property Insurance. (1988). ***America's Vanishing Coastlines: A New Concern for the Voluntary and Residual Property Insurance Markets.*** **Tampa, FL: National Committee on Property Insurance.**
Keywords:
Upton-Jones Amendment, building codes, erosion, coastal areas, Coastal Barrier Resources System, development, environmental policy, public policy, legislation
Abstract: What has been common knowledge to a small group of dedicated coastal engineering professionals for some years is slowly reaching the awareness of the American public—the beaches and shorelines of the nation are washing away with relentless consistency and increasing speed. This report broadly examines the issues and problems associated with coastal erosion and windstorms, including the rising sea level and continued coastal development. The report also briefly discusses the provisions and potential impacts of the Upton-Jones Amendment of 1988, which provides funds for the relocation or removal, under the Standard Flood Insurance Policy, of buildings in imminent danger of collapse from erosion. However, coastal engineers, geologists, and environmentalists fear this measure will provide added incentive for coastal development by removing the financial risk to the property owner. (Note: the National Flood Insurance Reform Act of 1994 repealed the Upton-Jones Amendment.)

National Credit Union Administration. (1995). ***Flood Insurance Compliance: Report to Congress 1994-1995*****. Alexandria, VA: National Credit Union Administration.**
Keywords:
National Credit Union Administration, mandatory purchase, lending institutions
Abstract: As required by the Riegle Community Development and Regulatory Improvement Act of 1994, the National Credit Union Administration submitted this report on compliance by insured credit unions with the requirements of the NFIP to Congress. The report includes a

description of the methods used to determine compliance, the number of insured credit unions examined during the reporting year, a listing and total number of insured credit unions found not to be in compliance, actions taken to correct incidents of noncompliance, and an analysis of compliance, including a discussion of trends, patterns, problems, and recommendations regarding reasonable actions to improve the efficiency of the examination process.

National Credit Union Administration. (1997). ***Flood Insurance Compliance: Report to Congress 1995-1997*****. Alexandria, VA: National Credit Union Administration.**
Keywords:
National Credit Union Administration, mandatory purchase, lending institutions
Abstract: As required by the Riegle Community Development and Regulatory Improvement Act of 1994, the National Credit Union Administration submitted this report on compliance by insured credit unions with the requirements of the NFIP to Congress. The report includes a description of the methods used to determine compliance, the number of insured credit unions examined during the reporting year, a listing and total number of insured credit unions found not to be in compliance, actions taken to correct incidents of noncompliance, and an analysis of compliance, including a discussion of trends, patterns, problems, and recommendations regarding reasonable actions to improve the efficiency of the examination process.

National Credit Union Administration. (1999). ***Flood Insurance Compliance: Report to Congress 1997-1999*****. Alexandria, VA: National Credit Union Administration.**
Keywords:
National Credit Union Administration, mandatory purchase, lending institutions
Abstract: As required by the Riegle Community Development and Regulatory Improvement Act of 1994, the National Credit Union Administration (NCUA) submitted this report on compliance by insured credit unions with the requirements of the NFIP to Congress. The report includes a description of the methods used to determine compliance, the number of insured credit unions examined during the reporting year, a listing and total number of insured credit unions found not to be in compliance, actions taken to correct incidents of noncompliance, and an analysis of compliance, including a discussion of trends, patterns, problems, and recommendations regarding reasonable actions to improve the efficiency of the examination process.

National Research Council. (1982). ***A Levee Policy for the National Flood Insurance Program*****. Washington, DC: National Academy Press.**
Keywords:
levees, flood control, structural approaches, floodplain management, insurance, mapping, flood disaster planning
Abstract: FEMA provided funding for this study and charged the National Research Council with making unbiased recommendations on levees. The document formulates principles for a levee policy that will provide equity for protected parties in terms of recognition for efforts spent in reducing their risk without encumbering program administration with an unwieldy number of variations in levels of recognition of levee efficacy. The committee defined six dimensions of levee recognition. The level of design protection appropriate for recognition depends on whether the application is for (1) reduction in insurance rates, (2) easing regulations for land occupancy, (3) eliminating requirements for the purchase of flood insurance, (4) permitting siting of critical facilities, (5) removing requirements for notifying occupants of the hazard, or (6) eliminating

warning and evacuation programs. Each recommended distinction was based on the experience and judgment of the committee members integrating technical considerations with economic and administrative factors. Each recommendation is reasoned and presented in the body of the report, and all of them are listed for convenience in a final summary chapter. Table 1 in Chapter 2 condenses the policy recommendations and mapping suggestions on one page.

National Research Council. (1983). ***Evaluation of Flood-Level Prediction Using Alluvial-River Models.*** **Washington, DC: National Research Council.**
Keywords:
erosion, modeling, riverine areas, hundred-year flood standard, Base Flood Elevation, alluvial fans
Abstract: Many communities, primarily in the western states, have experienced problems with computing flood-water elevations for flood insurance purposes under the NFIP. These problems focused on modeling channel erosion and sedimentation using fixed-bed models for flood insurance studies in communities affected by rivers with movable beds or channels. This study involved the application of six flow and sediment routing models for alluvial streams on reaches of selected rivers for which relatively complete data were available. The objective of the investigation was to determine whether degradation of the riverbed during flood passage has an effect on flood stage that should be incorporated into the calculation of floodzone limits. The authors conclude that, except in cases of rivers which have been severely disturbed by human intervention through local degradation or aggradation, the use of erodible river-bed models instead of fixed bed models cannot be justified in flood insurance studies.

National Research Council. (1990). ***Managing Coastal Erosion*****. Washington, DC: National Academy Press.**
Keywords:
erosion, coastal areas, public policy
Abstract: More and more of the nation's vast coastlines are being filled with homes and vacation resorts. The result is an increasing number of structures built on erosion-prone shores with many of these structures facing collapse or damage. In response to mounting property losses, Congress has given FEMA responsibility for incorporating coastal erosion into the NFIP. This book addresses the immediate question of how to develop an erosion insurance program as well as the larger issues introduced by the continually changing face of the nation's shorelines. The National Research Council (NRC) explores major questions surrounding a national policy on coastal erosion: Should the federal government be in the business of protecting developers and individuals who build in erosion-prone coastal areas? How should such a program be implemented? Can it prompt more responsible management of coastal areas? The volume provides federal policymakers, state floodplain and resource managers, civil engineers, environmental groups, marine specialists, development companies, and researchers with invaluable information about the natural processes of coastal erosion and the effect of human activity on those processes. The book also details the workings of the NFIP and the lessons to be learned from numerous state coastal management programs.

National Research Council, Committee on Flood Control Alternatives in the American River Basin. (1995). ***Flood Risk Management and the American River Basin: An Evaluation*****. Washington, DC: National Research Council.**

Keywords:
American River, risk management, Army Corps of Engineers, California, flood control
Abstract: This book reviews the Army Corps of Engineers' investigations of flood control options for the American River Basin and evaluates flood control feasibility studies for the watershed, with attention to the contingency assumptions, hydrologic methods, and other analyses supporting the flood control options. This book provides detailed comments on many technical issues, including a careful review of the 1991 National Research Council report *American River Watershed Investigation*, and looks beyond the Sacramento case to broader questions about the nation's approach to flood risk management. It discusses how to utilize information available about flood hazard reduction alternatives for the American River Basin, the potential benefits provided by various alternatives, the impacts of alternatives on environmental resources and ecosystems, and the trade-offs inherent in any choice among alternatives which does not lie in the realm of scientists and engineers, but in the arena of public decision making.

National Research Council, Committee on Alluvial Fan Flooding. (1996). *Alluvial Fan Flooding*. Washington, DC: National Academy Press.
Keywords:
alluvial fans, floodplain management, California, Arizona, Utah
Abstract: FEMA provided funding for this study and charged the National Research Council with making unbiased recommendations on alluvial fan flooding. The report addresses a wide range of issues related to alluvial fan flooding as considered by the Committee on Alluvial Fan Flooding. Chapter 1 discusses why the identification of hazards from alluvial fan flooding is controversial and the problems of definitions. Chapter 2 examines types of fans and flooding processes. Chapter 3 presents indicators developed to help delineate alluvial fans and alluvial fan flooding based on the committee's definition and discusses methodologies to delineate flood hazards on alluvial fans. Chapter 4 contains seven examples of fans in light of the definition and field criteria. The sites represent a range of flood processes, from unconfined water flooding and debris flows on untrenched active fans to confined water flooding in fully trenched inactive alluvial fans. The examples also show variable amounts of study—from intensive to casual. Chapter 5 presents a summary of the committee's conclusions and recommendations. One key conclusion states that the act of defining the type of flooding is independent from the act of deciding which methods are applicable for delineating the boundaries of the hazard. To that end, the committee recommends that FEMA expand the technical and regulatory input it receives in the delineation and regulation process, perhaps through the use of a technical advisory board composed of earth scientists, engineers, local regulating bodies, and those being regulated.

National Research Council, Committee on Assessing the Costs of Natural Disasters. (1999). *The Impacts of Natural Disasters: A Framework for Loss Estimation*. Washington, DC: National Research Council.
Keywords:
erosion, development, coastal areas
Abstract: This book explores major questions surrounding national policy on coastal erosion: Should the federal government be in the business of protecting developers and individuals who build in erosion-prone coastal areas? How should such a program be implemented? Can it prompt more responsible management of coastal areas? The volume provides federal

policymakers, state floodplain and resource managers, civil engineers, environmental groups, marine specialists, development companies, and researchers with information about the natural processes of coastal erosion and the effect of human activity on those processes. The book also details the workings of the NFIP as well as lessons to be learned from state coastal management programs.

National Research Council, Committee to Assess the U.S. Army Corps of Engineers Water Resources Project Planning Procedures. (1999). ***New Directions in Water Resources Planning for the U.S. Army Corps of Engineers*****. Washington, DC: National Academy Press.**
Keywords:
Army Corps of Engineers, federal programs, public policy, floodplain management, environmental restoration
Abstract: The Army Corps of Engineers (USACE) has long been one of the federal government's key agencies in planning the uses of the nation's waterways and water resources. Though responsible for a range of water-related programs, the USACE's two traditional programs have been flood damage reduction and navigation enhancement. The water resource needs of the nation have been shifting away from engineered control of watersheds toward restoration of ecosystem services and natural hydrologic variability. In response to these shifting needs, legislation was enacted in 1990 that initiated the USACE's involvement in ecological restoration, which is now on par with the USACE's traditional flood damage reduction and navigation roles. This book analyzes the USACE's efforts in ecological restoration, and provides broader recommendations on how USACE might streamline its planning process. The book also assesses the impacts of federal legislation on the USACE's planning and projects, and provides recommendations on how relevant federal policies might be altered in order to improve USACE planning. Another important shift affecting USACE has been federal cost-sharing arrangements (enacted in 1986), which mandate greater financial participation in the USACE's water projects by local cosponsors. The book describes how this has affected the USACE-sponsor relationship, and comments on how each group must adjust to new planning and political realities.

National Research Council, Committee on American River Flood Frequencies. (1999). ***Improving American River Flood Frequency Analyses*****. Washington, DC: National Academy Press.**
Keywords:
American River, Army Corps of Engineers, modeling, risk assessment, California
Abstract: In 1996 the Army Corps of Engineers (USACE) completed a congressionally directed reevaluation of flood control options for California's American River. In response, Congress authorized a component of the recommended plan but not an adequate plan for the reduction of flood risk in the Sacramento area. Thus, evaluations of alternatives are still required, in particular because the American River experienced a major flood in January 1997. The 1997 flood suggested that it may be necessary to re-compute flow frequency relationships for the American River at Sacramento. In February 1998, USACE published a revised unregulated rain flood flow frequency analysis for the American River at Fair Oaks. The analysis produced a flood frequency curve that indicates that large floods are appreciably more likely than previously thought. The report prompted controversy among local, state and federal government agencies, public interest groups, and others. This report provides an independent scientific assessment of flood frequency relationships for the American River at Sacramento. The 100-year flood estimate recommended

by this study would result in removal of some flood-prone areas of Sacramento from the AR Zone, which would result in suspension of building restrictions. However, the uncertainties in these estimates are large. The report recommends the establishment of a new interagency effort that would emphasize research focused on coordinated and cooperative flood risk reduction because the negative consequences of falsely designating certain flood-prone areas to be out of the regulatory floodplain would be catastrophic.

National Research Council, Committee on Beach Nourishment and Protection. (1999). *Beach Nourishment and Protection.* Washington, DC: National Research Council.
Keywords:
beach nourishment, Army Corps of Engineers, federal programs
Abstract: This book provides a basis for decision making with recommendations regarding the utility of beach nourishment and the appropriate role of federal agencies. It also examines the economic and social role of beaches, the history of beach nourishment projects, and management strategies for shore protection; discusses the role of the Army Corps of Engineers and other federal agencies, with a close-up look at the NFIP; explores the state of the art in project design and prediction of outcomes, including the controversy over the use of traditional and nontraditional shore protection devices; addresses what is known about the environmental impacts of beach nourishment; and identifies what outcomes should be targeted for continued monitoring by project officials.

National Research Council, Committee on Risk-Based Analysis for Flood Damage Reduction. (2000). *Risk Analysis and Uncertainty in Flood Damage Reduction Studies*. Washington, DC: National Research Council.
Keywords:
risk assessment, hydrology and hydraulics, modeling, Army Corps of Engineers
Abstract: This study describes and evaluates the Army Corps of Engineers' (USACE) use of risk-based analysis for the evaluation of hydrology, hydraulics, and economics in flood damage reduction studies. The study praises USACE for its adoption of risk analysis methods, but it also raises concern about several technical (modeling) issues. The committee recommended that USACE: (a) use annual exceedance probability as the performance measure of engineering risk; (b) improve its analysis of hydrologic, hydraulic, geotechnical, and economic uncertainties; (c) focus greater attention on the probabilistic issues of identifying, estimating, and combining uncertainties; (d) strive to reduce the considerable variation in the estimates of water surface elevation when using different models of river hydraulics; (e) evaluate the risk-based performance of a levee as a spatially distributed system; (f) undertake statistically ex-post studies to compare predictions of geotechnical levee failure probabilities as well as ex-post studies of other flood-damage reduction structures; (g) calculate the risks associated with flooding and the benefits of a flood damage reduction project structure by structure, rather than conducting risk analysis on damage aggregated over groups of structures in damage reaches; (h) adopt a consistent terminology for communicating risk analysis concepts within USACE and to the general public; (i) simplify and improve the complex and somewhat confusing criteria for certifying levees for inclusion in the NFIP, and (j) move toward a more comprehensive decision-making approach in flood damage reduction studies.

National Review Committee. (1992). ***Action Agenda for Managing the Nation's Floodplains – A Review of Floodplain Management in the United States: An Assessment Report*****. Boulder, CO: Natural Hazards Research and Applications Information Center, Institute of Behavioral Science, University of Colorado.**

Keywords:
floodplain management, federal programs

Abstract: This report supplements the committee's comments on a draft of *Floodplain Management in the United States: An Assessment Report*. The report outlines what the committee regards as the present situation with respect to floodplain management, how federal aims and activities have evolved, and desirable next steps. Floodplain management goals are twofold and interrelated: to reduce the vulnerability of all Americans to the danger and damage of floods and to preserve and enhance the natural values of the nation's floodplains. After listing the findings from the assessment, the committee recommends the following actions: (a) integrate flood loss vulnerability and protection of floodplain natural values into broader state and community development and resource management processes, (b) improve the data base for floodplain management, (c) give weight to local conditions, (d) minimize conflicts among federal programs, (e) reduce the vulnerability of existing buildings, and (f) improve professional skills and public education. The report provides a table of the federal agencies involved in floodplain management and the programs that each agency provides.

National Science Foundation. (1980). ***A Report on Flood Hazard Mitigation*****. Washington, DC: National Science Foundation.**

Keywords:
mitigation, flood control, floodplain management, public policy, federal programs, flood causes, risk perception, risk assessment, risk management

Abstract: At the request of the House Committee on Science and Technology, the National Science Foundation studied policies and research related to the mitigation of flood hazards. This report deals with basic causes, approaches, responses, and issues, which should lead to policy changes related to the mitigation of flood hazards. It discusses successively the nature and causes of flooding and its geographical distribution, damages, and trends. It reviews available means for coping with floods and details existing public and private institutions involved with mitigation. Two chapters discuss basic human responses to stress, uncertainty, and risk. The subsequent chapters present detailed analyses of geographical areas at high risk from flooding and an outline of a broad conceptual plan for multidisciplinary studies of the impact of floodplain management on the national level. These highlight the necessity to measure the impact and effectiveness of the multiple programs being applied in real or simulated circumstances. Findings and conclusions emerge at numerous points in the report, and these are summarized in a final chapter on conclusions and recommendations. For example, the report concludes that an effective system of mitigating flood hazards cannot occur unless local governments take primary responsibility. Meeting this responsibility should involve, according to the report, the availability of flood insurance continuing to be contingent upon appropriate local land-use planning and implementation. Also, federal measures to control floods and financial assistance in the acquisition of flood-prone structures and relocation of occupants out of the floodplain should be contingent on similar factors.

Natural and Beneficial Functions of the Floodplain Task Force. (2002). ***The Natural and Beneficial Functions of Floodplains: Reducing Flood Losses by Protecting and Restoring the Floodplain Environment.*** **Washington, DC: Natural and Beneficial Functions of the Floodplain Task Force.**

Keywords:
floodplain management, mitigation, environmental protection, federal programs

Abstract: Several federal agencies pooled their expertise to identify the natural functions of floodplains that reduce flood losses and recommend how the nation can further reduce flood losses through the protection and restoration of the natural functions of floodplains. Because floodplains reduce flooding and limit flood-related damages through their floodwater conveyance and storage functions, the task force advocates: 1) providing technical assistance to improve analytical approaches to floodplain management; 2) encouraging nonstructural solutions to reduce flood damage; 3) improving coordination and partnership among all levels of government and other stakeholders; and 4) ensuring that federal programs are working to achieve complementary floodplain management goals. The report concludes with eight case studies of successful floodplain management strategies around the United States. Successful strategies include cooperation of government bodies at all levels, restoration of open space in floodplains, and collaboration among funding agencies. The appendix lists all federal programs relating to the natural and beneficial functions of floodplains.

Natural Hazards Research and Applications Center. (1985). ***Evaluating the Effectiveness of Floodplain Management Techniques and Community Programs.*** **Proceedings of a Seminar conducted by the Tennessee Valley Authority in cooperation with the Interagency Task Force on Floodplain Management, Washington, DC, April 30-May 1, 1984. Boulder, CO: Natural Hazard Research and Applications Information Center.**

Keywords:
NFIP, compliance, floodplain management, enforcement, floodproofing, structural approaches, risk communication, mitigation, strategic planning

Abstract: Sponsored by the Tennessee Valley Authority with the cooperation of the Interagency Floodplain Management Task Force, the goal of this seminar was to examine existing and alternative cooperative approaches for evaluating and monitoring floodplain management techniques and community programs. The seminar was intended to assess the “state of knowledge” on this important topic and to suggest some priorities for future interagency research and action. Speakers, panelists, and other participants included university researchers, federal agency staff, state and local government employees, and private consultants who had investigated the feasibility and effectiveness of various techniques or community programs. This report is a collection of three products. Part I presents a brief overview of issues. Parts II and III are issue papers prepared prior to the seminar. Part IV contains papers presented by speakers and panelists in the seminar addressing specific issues. Finally, Part V provides conclusions and recommendations based on the issue papers, the papers presented at the seminar, and follow-up discussions with selected speakers and panelists. One of the recommendations from the seminar addresses the need for FEMA to improve the compatibility of the data it gathers from flood insurance policies, claims, biennial reports, and disaster assistance claims.

Neal, David M. (1992). Hurricane Andrew churns up debate. ***Forum for Applied Research and Public Policy,*** **10(1), 26-9.**

Keywords:
Hurricane Andrew, Hurricane Hugo, risk communication, federal programs
Abstract: In the wake of Hurricane Hugo and the Loma Prieta earthquake in 1989, the federal government developed a plan to guide future federal disaster response. The plan received final approval in April 1992 and received a full-scale test only four months later, when Hurricane Andrew struck south Florida in August. Despite the plan, Andrew's landfall was attended by rampant confusion and miscommunication. FEMA bore the brunt of post-disaster criticism. FEMA's performance in the days following Andrew resulted in part from imperfections in the plan, which proved overly bureaucratic and inflexible. To improve its emergency responsiveness, the federal government must simplify the presidential disaster-declaration process, continue to bolster the federal response plan, and help local governments boost their own preparedness while making them aware that federal disaster response can take several days even under the best circumstances.

New York State Department of Environmental Conservation, Division of Water, Flood Protection Bureau. (1991). *Floodplain Regulation and the National Flood Insurance Program: A Handbook for New York Communities*. Albany, NY: New York State Department of Environmental Conservation.
Keywords:
New York, NFIP, floodplain management, mitigation, compliance, enforcement, variances, development, mapping, building codes, substantial improvement, Community Assistance Visits
Abstract: This manual is designed for use by the person designated by the community as the local administrator of the NFIP. The manual provides guidance to the local administrator on how to understand NFIP requirements and how to apply the community's floodplain regulations. Chapter I explains the NFIP's purposes. Chapter II discusses the role of state government – particularly the Department of Environmental Conservation (DEC), the state coordinator for the NFIP. Chapter III discusses local responsibilities under the NFIP. Chapter IV explains the use of the Flood Insurance Study (FIS) and FIRMs. Chapter V contains the standards and regulations for development in a floodplain. Chapter VI concerns the duties of the local administrator, with emphasis on the procedure for issuing a floodplain development permit. Chapter VII briefly discusses other permits that might be needed for floodplain development. Finally, Chapter VIII contains information regarding procedures for amending or revising the flood maps. Appendices include a glossary of floodplain terminology, basics of flood insurance, a coastal construction code, and other useful information.

North, Carol S. and Barry A. Hong. (2000). Project CREST: A new model for mental health intervention after a community disaster. *American Journal of Public Health*, 90(7), 1057-9.
Keywords:
Midwest floods of 1993, Missouri, health effects
Abstract: When the Mississippi River and its tributaries flooded St. Louis, MO, in the spring and summer of 1993, 250 mental health professionals stood ready to help the thousands whose lives the floods would affect. It turned out, however, that most of the flood victims sought instead the support of community leaders they knew and trusted. To meet the need for community-based disaster support, disaster intervention training that had been offered to mental health professionals during the summer of 1993 was adapted to train community resource

personnel, ranging from clergy to police. The result was Project CREST (Community Resources for Education, Support, and Training). CREST's purpose is to maximize mental health resources within communities by equipping community leaders to provide initial crisis intervention and emotional relief services after community-wide disasters, when professional resources are often limited. CREST has also been adapted to other types of crisis intervention. Through Project CREST many people have received crisis intervention who otherwise might not have sought mental health care.

Norton, Clark F. (1988). ***Federal Disaster Relief Legislation and Administration: A Summary*****. Washington, DC: Congressional Research Service.**
Keywords:
disaster assistance, history, legislation, federal programs
Abstract: This report for Congress reviews provisions of federal disaster relief from the nineteenth century though April 1998. It discusses the ad hoc relief provided by Congress until the passage of the landmark "Major Disaster Relief Act of 1950." Furthermore, the report describes the provisions of that act and reviews subsequent developments leading to the 1970 and 1974 disaster relief acts and later amendments. It identifies the executive agencies that have administered federal disaster relief programs over the years. Appendices outline the emergency and major disaster relief powers of the president authorized by the 1974 Act and present the organization of FEMA, which administers the program.

Nq, Y. (1992). Optimal investment in urban drainage: A framework for cost-benefit analysis. ***Australian Economic Review*****, 25(3), 19-28.**
Keywords:
cost-benefit analysis, mitigation, urban areas
Abstract: This article addresses some basic issues including distributional weights, discount rates, and the value of life in a cost-benefit analysis of urban drainage and provides a framework for the estimation of the optimal amount of investment for flood mitigation. According to the author, such evaluation should involve: (a) estimating the expected total damage from flooding in present-value terms before flood mitigation; (b) computing the reduction in expected total damage as the average recurrent interval of flooding increases; (c) estimating how this interval increases with the amount of investment in flood mitigation; and (d) choosing the optimal investment by equating marginal benefit and marginal cost.

Office of Management and Budget (1998). ***Federal Programs Offering Non-structural Flood Recovery and Floodplain Management Alternatives*****. Washington, DC: Executive Office of the President.**
Keywords:
floodplain management, nonstructural approaches, wetlands, federal programs, easements, floodproofing, mitigation, relocation, buyouts, environmental policy
Abstract: This handbook, produced in cooperation with various federal agencies, provides information about federal programs that support nonstructural approaches to floodplain management, including broad strategies and specific federal programs that could form the basis for a nonstructural response to a flood event. Programs are grouped by three primary strategies: (a) acquisition, relocation, elevation, and floodproofing of existing structures; (b) rural land easements and acquisitions; and (c) restoration of wetlands. Programs offering technical

assistance for floodplain management are also reviewed. Summaries of 36 federal programs include information about each program's objective, agencies involved, form of assistance, program target, eligibility requirements, cost-sharing requirements, available funding, repayment requirements, application procedures, and contacts. The agencies that offer these programs include FEMA, the Army Corps of Engineers, National Park Service, Natural Resources Conservation Service, Environmental Protection Agency, HUD, SBA, Economic Development Administration, US Fish and Wildlife Service, and Commodity Credit Corporation.

Office of Technology Assessment. (1984). ***Wetlands: Their Use and Regulation*****. Washington, DC: Office of Technology Assessment.**
Keywords:
wetlands
Abstract: The Office of Technology Assessment (OTA) collected data from scientific literature; government reports; and responses to questionnaires about wetland use from 37 districts of the Army Corps of Engineers, 48 states, and from 11 trade associations. OTA also conducted case studies of wetland trends in 13 states, minor studies in eight states. These studies were supplemented with interviews of federal and state officials and industry representatives. As a result of its studies, OTA has identified three issues related to wetlands management. First, should federal involvement in protecting wetlands be increased or decreased? Second, should the federal government improve its policymaking capability through a systematic collection and analysis of additional information about wetlands? Finally, should the federal government develop a more integrated approach for managing the use of wetlands?

Office of Thrift Supervision. (1995). ***Flood Insurance Compliance: Report to Congress for 1994-95*****. Washington, DC: Office of Thrift Supervision, Department of the Treasury.**
Keywords:
Office of Thrift Supervision, mandatory purchase, lending institutions
Abstract: This report was submitted to Congress in accordance with the requirements of the National Flood Insurance Reform Act of 1994. The report describes the methods used to determine compliance, the number of insured credit unions examined during the reporting year, a listing and total number of insured credit unions found not to be in compliance, actions taken to correct incidents of noncompliance, and an analysis of compliance, including a discussion of trends, patterns, problems, and recommendations regarding reasonable actions to improve the efficiency of the examination process. OTS conducted 631 compliance examinations during the reporting period of September 1, 1994, to August 31, 1995, and found a total of 451 violations of the flood insurance regulations at 98 institutions. Most of the violations involved the failure to provide flood insurance notice or the failure to comply with the timing provisions for these notices. Furthermore, OTS found that overall compliance levels, measured as a percent of the institutions examined where no flood insurance violations were cited, ranged from a low of 78 percent in 1991 to a high of 88 percent in 1993.

Office of Thrift Supervision. (1997). ***Flood Insurance Compliance: Report to Congress for 1996-1997*****. Washington, DC: Office of Thrift Supervision, Department of the Treasury.**
Keywords:
Office of Thrift Supervision, mandatory purchase, lending institutions

Abstract: This report was submitted to Congress in accordance with the requirements of the National Flood Insurance Reform Act of 1994. The report describes the methods used to determine compliance, the number of insured credit unions examined during the reporting year, a listing and total number of insured credit unions found not to be in compliance, actions taken to correct incidents of noncompliance, and an analysis of compliance, including a discussion of trends, patterns, problems, and recommendations regarding reasonable actions to improve the efficiency of the examination process. OTS conducted 1,124 examinations during the reporting period of September 1, 1995, to August 31, 1997, and found a total of 398 violations of the flood insurance regulations at 131 institutions. Most of the violations involved the failure to provide flood insurance notices, the failure to comply with the content or timing provisions for these notices, and the failure to comply with the purchase requirements. Furthermore, OTS found that overall compliance during this reporting period increased by 4 percent over the prior reporting period (September 1, 1994, to August 31, 1995).

Office of Thrift Supervision. (1999). *Flood Insurance Compliance: Report to Congress for September 1997 to August 1999*. Washington, DC: Office of Thrift Supervision, Department of the Treasury.

Keywords:
Office of Thrift Supervision, mandatory purchase, lending institutions

Abstract: These reports were submitted to Congress in accordance with the requirements of the National Flood Insurance Reform Act of 1994. The report describes the methods used to determine compliance, the number of insured credit unions examined during the reporting year, a listing and total number of insured credit unions found not to be in compliance, actions taken to correct incidents of noncompliance, and an analysis of compliance, including a discussion of trends, patterns, problems, and recommendations regarding reasonable actions to improve the efficiency of the examination process. OTS conducted 950 compliance examinations during the reporting period of September 1, 1997, to August 31, 1999, and found a total 345 violations of the flood insurance regulations at 95 institutions. Most of the violations involved either the failure to provide, or the failure to complete the Standard Flood Hazard Determination Form; the failure to provide the flood insurance notice or to comply with the content or timing provisions for these notices; and the failure to comply with the purchase requirements. Furthermore, OTS observed that savings associations increased their overall compliance level from 84 to 90 percent from September 1, 1994, to August 31, 1999. OTS anticipates further increases in the future due to increased awareness of the importance of compliance with flood insurance regulations.

Olsen, J.R., P.A. Beling, J.H. Lambert, and Y.Y. Haimes. (1998). Input-output economic evaluation of systems of levees. *Journal of Water Resources Planning and Management—ASCE*, 124(5), 237-45.

Keywords:
economic impacts, economic modeling, levees, California, Midwest floods of 1993

Abstract: Large-scale flooding in northern California and the Midwest floods of 1993 demonstrate that floodplain management should be conducted for regions rather than for individual floodplains. Economic activities connect each floodplain to other floodplains and to areas not affected by flooding. A method is presented to estimate the economic effects of flooding over a region of interacting floodplains and other lands by incorporating a Leontief economic input-output model with a probabilistic description of the potential overtopping in a

system of levees. Expected economic damages may be greater if flooding reduces the availability of floodplain products that are used as inputs to other sectors of the economy. The model is used to evaluate the economic risk for an example of a distributed system of levees.

Olsen, J. R., P.A. Beling, and J.H. Lambert. (2000). Dynamic models for floodplain management. ***Journal of Water Resources Planning and Management—ASCE*****, 126(3), 167-75.**

Keywords:
buyouts, development, floodplain management, modeling, Pennsylvania, levees

Abstract: A dynamic model of floodplain management is developed that addresses nonstationary conditions, including land-use changes, channel modifications, economic development, and climate change and variability. The dynamic approach permits zoning, levee construction, and other decisions to be made sequentially, rather than only at the present. The dynamic model is formulated as a Markov decision process. A single-floodplain, single-objective, stationary model is extended to include multiple floodplains, nonstationarity, and multiple objectives. Linear programming is used for solution, though the problem may be large. The model is applied to a problem at Chester Creek, PA. The optimal policy for levee building or replacement depends on whether a flood has just occurred and on the costs of buying out properties and rebuilding homes and levees. Two cases of nonstationarity are examined—future bridge construction and future hydrologic changes. With nonstationarity, a buyout of properties following levee overtopping is an optimal policy since increased future flooding reduces the expected benefits of structural flood measures. When economic development is included with management costs and flood damages in a multiobjective formulation, the optimal policies include building larger levees and increasing floodplain development.

Ouellette, Pierre, Daniel Leblanc, Nassir El-Jabi, and Jean Rousselle. (1988). Cost-benefit analysis of flood-plain zoning. ***Journal of Water Resources Planning and Management,*** **114(3), 326-34.**

Keywords:
cost-benefit analysis, economic modeling, zoning, flood damage, methodology

Abstract: The economic yield of a floodplain-zoning program is measured by a cost-benefit analysis. The methodology entails the use of a probabilistic hydroeconomic model to evaluate expected flood damages with and without zoning. The application shows that this type of program, albeit cost-effective overall, may be unacceptable for various reasons to the various parties involved. While the program is cost-effective for all parties of the society, it is redistributive. Landowners are the main beneficiaries, while the cost-benefit ratio for governments is consistently less than one. Owing, however, to market imperfections, landowners gain no advantage from promoting such programs. This is an explanation why such programs are not implemented more widely.

Park, W.M. and W.L. Miller. (1982). Flood risk perceptions and overdevelopment in the floodplain. ***Water Resources Bulletin*****, 18(1), 89-94.**

Keywords:
development, Indiana, floodplain management, property values, economic modeling

Abstract: There is a long-standing hypothesis that imperfect information about potential flood hazards, an expectation of liberal disaster relief, and anticipation of future structural protection

have resulted in overdevelopment of floodplains. Data for a case study from Logansport, IN, were analyzed using multiple regression techniques in an effort to investigate this hypothesis. The effect of the introduction of the NFIP on residential property values was investigated in order to determine whether property values in floodplains were fully discounted for expected flood damages. The case study analysis shows that property values in the floodplain were less than fully discounted for the existing flooding potential prior to the introduction of the NFIP. Low-cost information such as lot elevation and distance from the river were found to affect sale price, apparently due to its role in the formation of perceptions about the potential for flooding. Policy alternatives for floodplain management that would provide better information on flooding potential and eliminate the perverse incentives created by the expectation of liberal disaster relief include simple zoning and actuarial insurance. Simple delineation of the 100-year floodplain with zoning restrictions would involve relatively low implementation costs, while the development of actuarially accurate premiums for flood insurance would be relatively costly. In any case, the study results indicate that unless policy changes eliminating the perverse incentives of past policies are adopted, overdevelopment of floodplains will continue.

Pasterick, Edward T. (1998). The National Flood Insurance Program. In Howard Kunreuther and Richard J. Roth, Jr., eds. *Paying the Price: The Status and Role of Insurance Against Natural Disasters in the United States*. Washington, DC: The Joseph Henry Press.

Keywords:

NFIP, history, agency operations and management

Abstract: The author overviews the NFIP, beginning with a short history. He then discusses the three components of the program's structure (risk identification, hazard mitigation, and insurance), and explains how the components need to be integrated through the cooperation of the federal government, state and local governments, and the insurance industry. The next section of this chapter describes the various initiatives of the NFIP, including the National Flood Insurers Association, the Write-Your-Own Program, and the Community Rating System. He concludes with a discussion of issues facing the NFIP and offers some solutions to those issues. Among others, Pasterick concludes that although the NFIP has been able to integrate its three critical components in the past, within the current structure of FEMA the risk identification and mitigation responsibilities are organizationally separated from the insurance operation. Continued coordination under this structure will require a level of effort beyond that needed when the three components were in the same office. Pasterick also notes that a major issue to be addressed in the area of mitigation is the matter of existing structures. Consensus on this issue is needed in order to make any policy effective. Furthermore, Pasterick discusses the NFIP's low market penetration. He lists five reasons for this low market penetration: (a) many floodplain residents underestimate the seriousness and likelihood of flooding; (b) lenders have not been especially zealous in requiring the purchase of flood insurance as the law requires; (c) policies for flood insurance are difficult for insurance agents to write and, therefore, to market aggressively because they are single-peril policies and are viewed as more costly than other lines of coverage; (d) many potential consumers expect that federal disaster assistance will adequately provide for post-flood recovery; and (e) many people are simply misinformed or unaware of the availability of flood insurance.

Patton, Ann. (1993). *From Harm's Way: Flood-Hazard Mitigation in Tulsa, Oklahoma.* Tulsa, OK: City of Tulsa.
Keywords:
Oklahoma, mitigation, disaster assistance, flood disaster planning, substantial damage
Abstract: On Memorial Day, 1984, more than a foot of rain fell on Tulsa. The resulting flood killed 14, injured 288, and left $188 million in damages citywide. On the day of the flood, city leaders met and agreed to approach the post-flood recovery from a new angle. This report focuses on Tulsa's floodplain clearance activities – one aspect of the city's comprehensive flood-hazard mitigation program – with emphasis on acquisition projects following the 1984 flood. The scope of the project included the acquisition of 300 homes from nine sites. Two years later, the city bought 228 flood-prone pads at a flooded mobile home park. The report is based on the remarkable work of many people including proactive citizens; courageous political leaders and civil servants; a diligent local news media; generous national experts; and partners in FEMA and the Army Corps of Engineers.

Peacock, Walter Gillis. (1997). Cross-national and comparative disaster research. *International Journal of Mass Emergencies and Disasters*, 15(1), 117-33.
Keywords:
national disasters, methodology
Abstract: Distinguishing characteristics and issues of comparative and cross-cultural research, problems and opportunities, and an assessment of future prospects are offered and related to disaster research. No single approach is advocated; rather, various approaches (case study to cross-national, contemporary to historical, and qualitative to quantitative) are recommended. Methodological issues including model specification, problems of aggregation, intra- versus international variation, and secondary versus primary data collection are addressed. Particular attention is devoted to issues of equivalence related to conceptualization, data comparability, operationalization and measurement, conversion, standardization, and units of observation. The need for systematic efforts to develop research tools that can be utilized to measure critical concepts such as recovery, restoration, risk, and mitigation is identified. Finally, discipline-based, yet disaster relevant, cross-national and comparative research agendas consistent with a broader ecological perspective targeting disasters, development, and the social production of vulnerability are advocated.

Pennsylvania Department of Community and Economic Development. (1998). *Meeting the Minimum Requirements of The National Flood Insurance Program and the Pennsylvania Flood Plain Management Act (1978-166) Section 60.3 (d)*. Harrisburg, PA: Pennsylvania Department of Community and Economic Development.
Keywords:
Pennsylvania, floodplain management, compliance, enforcement
Abstract: This suggested ordinance was prepared to help municipalities meet the requirements of the NFIP and the Pennsylvania Floodplain Management Act (Act 166 of 1978). More specifically, this ordinance contains all the provisions necessary to comply with the requirements of Section 60.3 (d) of 44 CFR (NFIP) as well as with the requirements of Act 166 of 1978 and the regulations adopted by the Department of Community and Economic Development pursuant to that Act.

Pennsylvania Department of Community and Economic Development. (2001). *Flood Plain Management Regulations.* Harrisburg, PA: Pennsylvania Department of Community and Economic Development.
Keywords:
Pennsylvania, floodplain management, compliance, enforcement
Abstract: This publication outlines the Commonwealth's floodplain management regulations adopted pursuant to the Pennsylvania Floodplain Management Act (Act 166 of 1978). Topics addressed by the regulations include: municipal participation in the program, adoption of floodplain management by identified municipalities, municipal loss of eligibility to participate in the program, regulation of particular obstructions, coordination and uniform enforcement of municipal floodplain management regulations, inspections, enforcement by the department and appeals, and reimbursements and grants to municipalities.

Pennsylvania Department of Community and Economic Development. (2001). *Technical Information on Floodplain Management: Administrative Guidelines for Development.* Harrisburg, PA: Pennsylvania Department of Community and Economic Development.
Keywords:
Pennsylvania, compliance, development, permits, enforcement, floodplain management, floodway, floodproofing, variances, substantial improvement, mobile homes
Abstract: To participate in the NFIP, a municipality must enact a code or ordinance, which at a minimum, meets FEMA's floodplain management requirements. This means that a participating municipality must regulate all construction and development within those areas of the community identified by FEMA as being flood-prone. To accomplish this, a municipality must issue a building permit before any construction or development takes place. This ensures that the municipality has the opportunity to review all proposed activities for compliance with any applicable floodplain management regulations. While it may sound rather simple and straightforward, it is not always an easy matter to distinguish between those activities that require a permit and those that do not. The report provides information to help municipalities become more confident in making this determination.

Perry, Ronald W. (1994). A model of evacuation compliance behavior. In Russell R. Dynes and Kathleen J. Tierney, eds. *Disasters, Collective Behavior, and Social Organization,* 85-98. Newark, DE: University of Delaware Press.
Keywords:
risk communication, modeling, Texas, Washington, disaster planning
Abstract: This study develops a model of evacuation compliance behavior based on secondary empirical analyses of three disasters—a flood in Abilene, TX, a hazardous materials incident in Mt. Vernon, WA, and the eruption of Mt. St. Helens in Washington. Following a brief discussion of the theoretical modeling process, factors influencing individuals' evacuation decisions are identified: warning confirmation, source credibility and content, perceived risk, possession of an adaptive plan, and family context. The data support the assertion that families evacuate only after all members are present or known to be safe. According to the author, the creation of an adaptive plan (through warning information, prior experience, and/or preplanning) would facilitate compliance with evacuation warnings, as does the belief that the impending disaster would result in direct personal harm. Furthermore, evacuation is promoted by the credibility of the source of

information. Finally, the author concludes that the most effective warning messages are specific concerning the danger, consequences, timing, and response strategies in the face of disaster.

Perry, Ronald W., Michael K. Lindell, and Marjorie R. Greene. (1982). Crisis communications: Ethnic differentials in interpreting and acting on disaster warnings. ***Social Behavior and Personality,*** **10(1), 97-104.**
Keywords:
risk communication
Abstract: This article examines the problem of communicating information about floods to multiethnic communities. Data were gathered from interviews of a probability sample of 200 recipients of flood evacuation warnings living in a small western US town with a large population of Mexican-Americans. Analyses reveal that residents surveyed were more skeptical than whites about warning messages, no matter how specific the message; interpreted the same warning messages as indicating lower levels of personal danger; and were less likely to undertake a protective action (i.e., evacuate) than white residents.

Philippi, Nancy S. (1994). ***Revisiting Flood Control: An Examination of Federal Flood Control Policy in Light of the 1993 Flood Event on the Upper Mississippi River.*** **Chicago, IL: Wetland Research, Inc.**
Keywords:
Midwest floods of 1993, mitigation, history, federal programs, flood control
Abstract: This article examines the Midwest floods of 1993 by providing a history and detailed description of the event and pertinent mitigation policies. It describes three case histories from which the author concludes that the programs that pursue the intended goals of the US flood control policy are flawed. (Such intended goals are to protect development where it is economically justified, to prevent and reduce damageable development, and to compensate those who suffer blamelessly and excessively from flooding.) The author argues that mitigation programs to reduce flood damages are still a minor part of the NFIP. The author complains that the NFIP provides protection to private properties without calculating the cumulative costs of providing that protection, and that the "overly generous" payments in compensation for agricultural flood damages eliminate the risk and make it highly profitable to farm in a floodplain. However, the author warns the reader that the conclusions are general and were drawn from the three case histories described in the report. Whether these cases are merely anomalies or whether they are true reflections of these programs is beyond the scope of the work.

Philippi, Nancy S. (1995). Plugging the gaps in flood-control policy. ***Issues in Science and Technology,*** **11(Winter), 71-8.**
Keywords:
disaster assistance, flood control, public policy, environmental impacts
Abstract: The author claims that US flood-control policy (as of 1995) wastes money, promotes behavior that exacerbates the problem, distributes relief disproportionately, and damages the environment. The author also claims that although better policies are neither expensive nor technologically difficult, they require the resolution of some sticky issues, equity and firmness in their execution, and, most important, the political backbone to make flood-control decisions before an emergency arises. New policy should reduce ad hoc disaster aid, establish a means test for distributing it, and use the savings to reduce damages and restore wetlands; incorporate

disaster funding into the annual budget process; tighten existing flood- and crop-insurance programs; limit new structural protection to key facilities and examine the economic justification for repairing existing ones; and promote more and better flood research.

Philippi, Nancy S. (1996). *Flooding Management: Ecologic and Economic Perspectives*. Austin, TX: Environmental Intelligence Unit, R.G. Landes Company.
Keywords:
floodplain management, history, environmental impacts, economic impacts
Abstract: This book synthesizes the past development and status of floodplain management in 1995. It describes the nature of flooding, its causes, and its importance in the ecological cycle and defines the conflict of interest between ecological and economic values inherent in floodplain management. Philippi reviews the historical and logical development of floodplain management policy. She also identifies the problems encountered in the execution of agreed-upon floodplain management objectives and it describes some scenarios, successful and otherwise, that future floodplain management may follow.

Pielke, Roger A., Jr. and Mary W. Downton. (2000). Precipitation and damaging floods: Trends in the United States, 1932-97. *Journal of Climate*, 13, 3525-37.
Keywords:
flood damage, modeling, flood causes, weather
Abstract: This paper presents a conceptual framework for the systematic assessment of the factors that condition observed trends in flood damage. Using the framework, it assesses the role that variability in precipitation has in damaging floods in the United States at both the national and regional levels. Three measures of flood damage each lead to different conclusions about the nature of the flood problem. At a national level, the precipitation measures most closely related to flood damage are the number of two-day heavy rainfall events and the number of wet days. This study indicates that growth in recent decades in total damage is related to both climate factors and societal factors. At the regional level, this study reports a stronger relationship between precipitation measures and flood damage and indicates that different measures of precipitation are most closely related to damage in different regions. Thes study indicates that climate plays an important, but by no means determining, role in the growth of flooding in the United States in recent decades.

Pielke, Jr., R.A., M.W. Downton, and J.Z. Barnard Miller. (2002). *Flood Damage in the United States, 1926-2000: A Reanalysis of National Weather Service Estimates*. Boulder, CO: University Corporation for Atmospheric Research.
Keywords:
flood damage, weather
Abstract: This study is a reanalysis of flood damage estimates collected by the National Weather Service (NWS) between 1925 and 2000. The NWS data are estimates of direct physical damage due to flooding that results from rainfall or snowmelt. They are obtained from diverse sources, compiled soon after each flood event, and not verified by comparison with actual expenditures. Therefore, a primary objective of the study was to examine the scope, accuracy, and consistency of the NWS damage estimates to improve the data sets and offer recommendations on how they can be appropriately used and interpreted. Evaluation of the accuracy of the estimates led to the following conclusions: individual damage estimates for small floods or for local jurisdictions

within a larger flood area tend to be extremely inaccurate, damage estimates become more accurate at higher levels of aggregation, and floods causing moderate damage are occasionally omitted, or their damage greatly underestimated in the NWS data sets. In summary, the NWS flood damage estimates do not represent an accurate accounting of actual costs, nor do they include all of the losses that might be attributable to flooding. Rather, they are rough estimates of direct physical damage to property, crops, and public infrastructure.

Plasencia, Doug. (1994). Sharing the Challenge: Future impacts and next steps. *Water Resources Update*, 97(Autumn), 14-6.
Keywords:
floodplain management
Abstract: This article highlights four recommendations from *Sharing the Challenge* (commonly called the Galloway report) that lay the framework for continued policy evolution and development. First, the author recommends improved federal coordination in floodplain management programs and policy. Second, a more strategic and managed system of delivering flood programs across a broad geographic region is needed to replace the current system. Third, the executive order on floodplain management, issued in 1977, should be revisited and modified to reflect policy developments, including the identification of a monitoring and enforcement mechanism. Finally, alternative means of quantifying federal interests in the environment and other policy areas are needed to resolve some of the confusion surrounding the criteria for justifying projects.

Platt, Rutherford H. (1976). *The National Flood Insurance Program: Some Midstream Perspectives.*
Keywords:
floodplain management, legislation, takings
Abstract: This report argues that the NFIP has been a necessary tool to supplement federal flood control works and disaster relief and looks at its progress to date. The number of communities participating in the NFIP has increased dramatically from four communities in its first year to 13,000 in 1976. The increased participation is due in part to program amendments in the Flood Disaster Protection Act of 1973. However, the report warns that the most difficult step of fully implementing the NFIP is still ahead – the incorporation of local governments into the regular, as opposed to provisional, program. In the author's estimation, the NFIP needs to overcome the hurdles of constitutional issues involved in takings without compensation, the technical challenges of mapping, the establishment of premium rates, and the determination of regulatory standards regarding floodways to fully implement floodplain management.

Platt, Rutherford H. (1985). Congress and the coast. *Environment*, 27(6), 12-7, 34-40.
Keywords:
Coastal Barrier Resources Act, legislation, coastal barriers, development
Abstract: Written not long after passage of the Coastal Barrier Resources Act (CBRA), this article notes that CBRA did not expressly prohibit the right of private owners to develop their property on the coast. It simply denies some, but not all federal benefits (e.g., flood insurance) when property owners decide to develop. CBRA did not affect other forms of federal help such as federal disaster assistance to repair infrastructure and income tax write-offs for casualty losses and accelerated depreciation after a loss. The author argues that by increasing the risk in these

areas, CBRA may have increased pressure for private development of adjoining areas that are still entitled to the full spectrum of federal benefits, such as flood insurance.

Platt, Rutherford H. (1986). Metropolitan flood loss reduction through regional special districts. *Journal of the American Planning Association*, 52(4), 467-79.
Keywords:
floodplain management, public policy, urban areas
Abstract: Flood damage is increasing in US metropolitan areas because of urbanization in small watersheds and floodplains and because of inadequate storm drainage. The NFIP is a necessary but insufficient response to the problem. Additional measures and programs tailored to the particular region are needed since each area has different flood problems and operates in a different legal and political framework. Three regional districts were examined and their attempts at solving the problems associated with flooding are described. All three districts reflect a viewpoint that may be emulated elsewhere: metropolitan floods are an area-wide phenomenon requiring a regional response. Local floodplain management, state, and federal mitigation efforts are necessary, but regional districts fill a functional and administrative gap in the hierarchy of public authority. Regional districts interact with other governmental organizations as well as act independently, as exemplified by the described detention policies of the districts in Harris County, TX, and Chicago, IL. A regional district also may perform a particular function more competently than another unit of government as shown by the example of floodplain maps developed by the district in Denver, CO. The fiscal autonomy of the regional district allows it to take needed actions promptly and at no cost to the federal or state taxpayer. It is concluded that regional districts are effective in reducing flood losses.

Platt, Rutherford H., ed. (1987). *Regional Management of Metropolitan Floodplains*. Boulder, CO: Institute of Behavioral Science, University of Colorado.
Keywords:
public policy, urban areas, Canada, England, Australia, Germany, Japan
Abstract: This report examines responses to metropolitan flooding at a regional level, that is, on a scale broader than individual municipalities, but narrower than the state. Unlike municipalities and states however, regions usually lack easily identifiable political surrogates. Governance of metropolitan regions is a patchwork quilt of traditional units of government—local, county, and state—supplemented by a variety of programmatic adjustments. Such adjustments include regional planning entities, special districts and authorities, intergovernmental agreements, boundary changes, and the modernizing of existing county units. Part one of this volume describes three stages of research on regional experiences in the United States. Part two consists of five case studies, conducted simultaneously with the domestic ones, concerning response to metropolitan flooding in Canada, Great Britain, Australia, Germany, and Japan. These studies illustrate the effects of differing legal and political contexts, as well as diverse hydrologic regimes, on governmental response to metropolitan flooding.

Platt, Rutherford H. (1995). Sharing the Challenge: Floodplain management into the 21st century. *Environment*, 37(1), 25-9.
Keywords:
floodplain management, Midwest floods of 1993, Mississippi River, levees

Abstract: The author reports on the floodplain management policies of the Mississippi River Basin. He reexamines flood control policies and discusses the disaster brought about by improper floodplain management. The author asserts that filling wetlands for the agricultural construction of levees exacerbated the Midwest floods of 1993. Finally, the author discusses decisions about the rebuilding of levees and its stress on interagency and intergovernmental cooperation.

Platt, Rutherford H. (1999). ***Disasters and Democracy: The Politics of Extreme Natural Events.*** **Washington, DC: Island Press.**
Keywords:
natural disasters, public policy
Abstract: This book is concerned with the political response to natural disasters, however they may arise. Specifically, the author is interested in the changing role of the federal government from distant observer to immediate responder, principal financier of disaster costs, and, more recently, champion of hazard mitigation. The book raises the question as to whether federalizing the costs of disasters is helping lighten the overall burden of disasters or, perversely, whether it is making matters worse. Additionally, have the availability of federal disaster assistance, flood insurance, and other benefits inadvertently contributed to a false sense of security, roughly equivalent to the discovery in the 1960s that federal flood control projects were stimulating development in protected floodplains?

Platt, Rutherford H., H. Crane Miller, Timothy Beatley, Jennifer Melville, and Brenda G. Mathenia. (1992). ***Coastal Erosion: Has Retreat Sounded?*** **Boulder, CO: Institute of Behavioral Science, University of Colorado.**
Keywords:
beach nourishment, coastal areas, development, erosion, Hurricane Hugo, nonstructural approaches, relocation
Abstract: This text examines the extent and spatial distribution of coastal erosion and the role of human intervention in both accelerating and preventing further erosion. The authors go on to analyze the federal responses to coastal erosion, in the form of physical alterations and financial incentives, such as the NFIP. The legislative restrictions on coastal construction and responses to coastal erosion are examined in ten states and compared for common approaches. The authors find that most states focus on prospective development, allowing existing homes to be "grandfathered" into regulations. With the exception of a defunct program in Michigan, no state has attempted to encourage or subsidize voluntary relocation of structures from eroding coastlines. Public acquisition of eroding areas and repetitively flood-damaged areas is not a major part of state environmental programs. The largest obstacle to the adoption and implementation of restrictions on coastal development is political considerations, perhaps exacerbated by the perception of a safety net from the NFIP and from FEMA's disaster assistance programs. Where regulations do exist, they tend to be too narrowly defined, with significant loopholes: procedures in the wake of a catastrophic storm allow a lenient application of the substantial damage determination, and generally facilitate rebuilding in the same hazardous areas.

Platt, Rutherford H, David Salvesen, and George H. Baldwin II. (1999). Did public regulations matter? Rebuilding the North Carolina Coast after Hurricane Fran. ***Coastal Management,*** **30(3), 249-69.**

Keywords:
Hurricane Bertha, Hurricane Fran, mitigation, North Carolina, substantial damage
Abstract: For a quarter century, North Carolina has sought to manage new oceanfront development under its 1974 Coastal Area Management Act. The results of these planning efforts were put to the test in 1996 when Hurricanes Bertha and Fran struck the state within a two-month period. With beaches and dunes impaired by Bertha, Fran inflicted widespread devastation along the southern half of the state's open ocean coast. The rebuilding process was fueled by federal disaster assistance of many kinds, including emergency dune replacement, flood insurance payments, and loans from the Small Business Administration to homeowners. This report looks at the rebuilding of the North Carolina coast after Hurricane Fran and reviews how well or poorly traditional approaches to coastal hazards management have worked and whether public regulations have discouraged or encouraged redevelopment in high hazard coastal areas. The author reports that as of 1998, there has been extensive rebuilding of pre-Fran structures at a larger scale, but in some cases with greater safety from future storms through higher architectural elevation and setbacks along eroding shores. Such mitigation, however, has been required only for structures determined by local officials as substantially damaged. Some perceive that politics and generous federal disaster benefits have undermined the effectiveness of the state's longstanding commitment to coastal hazard mitigation.

Pompe, J.J. and J. Rinehart. (1995). The value of beach nourishment to property owners: Storm damage reduction benefits. *Review of Regional Studies,* 25(3), 271-8.
Keywords:
beach nourishment, economic modeling, South Carolina, flood damage
Abstract: This study offers a method for estimating the benefits to property owners from beach nourishment. The authors used a hedonic pricing model to estimate the increased protection value that wider beaches provide for single-family homes in two oceanfront communities in South Carolina. These benefits of reduced storm damages accrued not only for oceanfront property that suffers the most damage but also for properties farther back from the ocean. The authors find that a nourishment project proposed by the Army Corps of Engineers would produce approximately $63.8 million of cumulative benefits to owners of single-family houses, which translates into a cost-benefit ratio of 1.96.

Potter, Kenneth W. (1994). Estimating potential reduction in flood benefits of restored wetlands. *Water Resources Update,* 97(Autumn), 34-7.
Keywords:
modeling, wetlands, environmental restoration, methodology
Abstract: In the United States most flood-related analysis is based on the simulation of a small number of design events. This paper discusses the limitations of the use of design events to evaluate wetland restoration. For example, because design events are based on hydrologic modeling of discrete events rather than on continuous hydrologic modeling, they do not account for the prestorm water stored in the wetland system, for the wide variations that can occur in individual flood events in the spatial and temporal stormflow conveyance. The article outlines an alternative methodology for evaluating flood-mitigation benefits of specific restoration projects. Continuous simulation is an alternative approach that overcomes many of the drawbacks of design event methods.

PR News. (1997). FEMA's far-reaching public affairs efforts mitigate flood of concerns. *PR News*, 53.

Keywords:
risk communication, marketing, Cover America

Abstract: FIA launched a significant public affairs program to prepare for a period of high flood potential. Elements of the program include a television spot, messages on snow melt, radio announcements, news conferences, and roundtable symposia to address questions from individuals living in areas where policy coverage has been sparse. Previously, FIA relied on its "Cover America" ad campaign and miniconferences designed for the public, regional press, local and state officials, and lenders in major floodplains. FIA's new approach couples public-based issues with industry concerns and includes devices from dispelling myths about flood insurance to offering commissions to insurers if they write policies on behalf of the federal government. The article also describes the Environmental Protection Agency's public affairs campaign for its Superfund clean-up program for hazardous environmental sites. The EPA uses broadcast faxes, the Internet, hotlinks, and e-mail delivery of press releases to disseminate information about Superfund sites. In addition, community involvement coordinators at each Superfund site host local meetings, go door to door to talk to residents during emergency removals or long-term cleanups, set up community advisory groups, and make informational materials available.

PricewaterhouseCoopers. (1999). *Study of the Economic Effects of Charging Actuarially Based Premium Rates for Pre-FIRM Structures*. Washington, DC: FEMA.

Keywords:
economic impacts, insurance premiums, pre-FIRM structures, subsidies, property values

Abstract: This study attempts to determine the number and types of properties nationwide that would be affected by reducing or eliminating subsidies for pre-FIRM structures and estimating the subsequent effects on premiums, participation in the NFIP, property values, and property tax revenue. The study undertook field surveys and data collection and reviewed seven different policy scenarios for elimination of the subsidy. Results suggest that eliminating a majority of the subsidy for pre-FIRM structures would increase the average annual premium for these structures from $585 to about $2000 within a year. Furthermore, if FEMA eliminated the subsidy immediately, the participation rate for pre-FIRM structures in SFHAs would likely decrease from 26 percent in 1997 to 20 percent in 1998, and then increase to about 29 percent in 2022. According to estimates, immediate elimination of the subsidy would decrease property values for pre-FIRM, single-family structures by four percent in 1998 and property values of pre-FIRM, multiple family structures by seven percent in 1998. The higher property value declines associated with multiple family structures reflect that relatively higher concentrations of these structures are located in areas subject to coastal flooding.

Quinn, Rebecca C. (1996). Floodplain management insures against losses. *FORUM for Applied Research and Public Policy*, 11.

Keywords:
risk perception, awareness, insurance

Abstract: The former NFIP coordinator for the state of Maryland says that flood insurance has failed because property owners think floods would not happen to them, and, even if insured, they often rebuild in the same flood-prone zones. The NFIP has proposed offering mitigation

insurance, which would pay the owner of an insured, flood-damaged structure an additional settlement for mitigation measures to prevent and/or reduce future flood damage.

Rasmussen, J.L. (1994). Floodplain management into the 21st century: A blueprint for change—Sharing the challenge. *Water International*, 19(4), 166-76.
Keywords:
floodplain management, Midwest floods of 1993, Mississippi River, strategic planning
Abstract: The article summarizes of the Interagency Floodplain Management Review Committee's Report to the Clinton Administration's Floodplain Management Task Force. The author was a member of the committee, which proposed a better way to manage the nation's floodplains. The report not only describes the nature and extent of the Midwest floods of 1993 and government efforts to cope with the event, but also presents a blueprint for change. This blueprint is directed at both the upper Mississippi River Basin and the nation as a whole. Its foundation is a sharing of responsibilities and accountability among all levels of government, business, and private citizens. It provides for a balance among the many competing river and floodplain uses; it recognizes, however, that all existing floodplain activity simply cannot be discarded as inappropriate. The committee believes that, if implemented, the recommended approach will bring about changes necessary to reduce flood vulnerability to both the infrequent major flood events and the more frequent smaller ones. Implementation also will reduce the environmental, social, and economic burdens imposed by current conditions on both public and private sectors. The committee's report includes an action plan delineating proposed responsibilities and time lines for execution of recommendations, a fiscal impact statement, and the findings of the preliminary Scientific Assessment and Strategy Team's report.

Rasmussen, Jerry L. (1994). Environmental restoration – Floodplains vs. potholes. *Water Resources Update*, 97(Autumn), 29-33.
Keywords:
environmental protection, riverine areas, floodplain management, Mississippi River, environmental restoration
Abstract: Riverine habitats and ecosystems can be self-renewing and the integrity of an ecosystem can be effectively restored in the form of focus areas for aquatic habitat, aimed primarily at preserving native riverine species. Restoration and maintenance of habitats that simulate natural conditions are critical to the restoration and management of native aquatic species and may be the last best chance to address riverine endangered species needs. Specific features proposed by a floodplain management bill introduced by Montana Senator Max Baucus are described as critical to near-term aquatic ecosystem restoration in the Mississippi River Basin. Included are the following: (a) a comprehensive evaluation of the upper Mississippi River; (b) river basin management planning; (c) habitat projects and resource monitoring; (d) congressional recognition of environmental and recreational resources; (e) environmental improvement; and (f) restoration of aquatic habitats.

Rettger, Michael J. (1977). *An Economic Analysis of Alternative Federal Flood Damage Assistance Programs.* Washington, DC: Office of Water Research and Technology.
Keywords:
economic modeling, New York, federal programs, disaster assistance

Abstract: An economic analysis of alternative flood relief programs is presented based on the simulated flooding experience of the Binghamton, NY, metropolitan area. The theory of consumer choice under conditions of uncertainty is used to develop evaluation criteria for flood insurance and disaster loan programs, based on the benefits and costs of each program to both the public and the private sectors. A simulation model provides data for empirical implementation of the program analysis. The flood relief simulator is applied to a variety of possible assistance programs, including the NFIP and SBA's Disaster Loan Program. Model results suggest that program designs cause substantial variations in costs, not only in terms of total outlay but also in the distribution of costs between the government and individuals.

Rettger, Michael J. and Richard N. Boisvert. (1979). Economics of Federal Flood Insurance and Loan Programs. *Search Agriculture*, 9(2), 1-39.
Keywords:
cost-benefit analysis, economic modeling, insurance purchase decision, subsidies
Abstract: This study examines the economics of alternative federal flood insurance and disaster loan programs, the distribution of program costs and benefits among public and private entities, and the effect of cost distribution on relocation decisions. The four alternative flood insurance and disaster loan programs evaluated were the regular and emergency flood insurance programs, the Small Business Administration's disaster loan program, and a subsidized loan program of experimental design. The study finds that from a theoretical perspective, a property owner would prefer an unsubsidized insurance or loan program to no assistance at all. The study also analyzes the variability of flood disasters. Average annual flood damages in the study area were estimated at $1.1 million but the damages varied between the two-year flood at $197,000 and the 500-year flood at $57 million. The vast majority of damages were also concentrated in several categories of residential and commercial properties. The implication is that targeting these few classes of properties can greatly reduce flood costs. The study found that the added costs of flood insurance premiums to maintaining property were minor and would be unlikely to induce a property owner to relocate.

Rettger, Michael J. and Richard N. Boisvert. (1979). Flood insurance or disaster loans: An economic evaluation. *American Journal of Agricultural Economics*, 61(3), 496-505.
Keywords:
economic modeling, federal programs, disaster assistance
Abstract: This study uses simulated data to perform an economic comparison between flood insurance and disaster loans. Disaster loans were the prevailing form of assistance in the 1950s, when SBA represented the primary source of federal aid. Results were inconclusive since they varied according to model assumptions. Variations in premium and interest rate subsidies had major effects on the distribution of total cost between the public and private sectors.

Richardson, Harry W., Peter Gordon, and Myung-Jin Jun. (1991). *The Economic Impact of FEMA Flood Protection and Insurance Requirements on Ten Cities in the Los Angeles County Floodplain*. Los Angeles, CA: Planning Institute, University of Southern California.
Keywords:
compliance, development, California
Abstract: The authors analyze the expected economic repercussions during the period 1992-2005 of new construction standards and flood insurance requirements on ten cities in Los

Angeles County's floodplain. The authors looked at three variables they felt may cause adverse local and regional economic impact: deferred construction, higher costs associated with compliance requirements for development, and flood insurance premiums that may drain resources from other forms of spending (offset in part, by a stimulus to the insurance industry). The authors surmise that the program will significantly discourage development in the floodplain. They conclude that floodplain location and the insurance requirements have massive, adverse economic impacts on the ten cities studied.

Richman, Sheldon L. (1994). Federal flood insurance: Managing risk or creating it? *Regulation*, 16(3), 15-17.
Keywords:
development, subsidies
Abstract: The author contends that the Midwest floods of 1993 demonstrate the self-defeating nature of the federal government's handling of natural disasters and that federal policies subsidize the cost of living in risky areas such as floodplains. The NFIP runs a deficit, has not constricted coastal development, and pays a third of its payments to 3 percent of claimants. While federal officials and the insurance industry maintain that floods are not an insurable risk, some private, though expensive, policies are available. Deregulated private insurance is an alternative. Some insurers defend the NFIP because they make money but incur no risk by selling policies. Massachusetts Senator John Kerry introduced S. 1405, which would prohibit new federal insurance policies in high-risk erosion areas. However, this bill would perversely expand federal control and violate property rights. The author believes that citizens should be free to do what they wish with their property and should accept the consequences.

Riley, Ann L. (1994). The greening of federal flood-control policies: The Wildcat-San Pablo Creeks case. In Rutherford H. Platt, Rowan A. Rowntree, and Pamela C. Muick, eds. *The Ecological City: Preserving and Restoring Urban Biodiversity*. Amherst, MA: University of Massachusetts Press.
Keywords:
California, environmental restoration, flood control, urban areas
Abstract: Local flood-control projects along streams and rivers have long been dominated by designs that use concrete and hydraulic engineering that is rectilinear and non-ecological. However, an urban flood-control project may be designed to restore natural habitat and enhance the environment while reducing the threat from floods. The thirty-six year history of planning for the Wildcat and San Pablo Creeks in North Richmond, CA, may result in an environmentally sensitive flood control project if the current design is successfully implemented and managed over time. This experience offers many lessons for similar projects elsewhere.

Robb, John A. (1994). Economic and environmental challenges. *Water Resources Update*, 97(Autumn), 17-20.
Keywords:
environmental protection, flood control
Abstract: The chairman of the Upper Mississippi Flood Control Association (UMFCA) writes that flood control is the cornerstone of a river transportation infrastructure that permits navigation, economic development, and environmental and social stability. The current environmental challenge is to find a way to provide for all four of these essential parts in a

compatible way without destroying or preventing future enhancement and development of any of the others. The challenge is further complicated by pro-environmental politics and financial reality. The UMFCA remains a strong supporter of navigation improvements, the continued protection of private property, economic development, and environmental protection. It believes that the balanced system of flood control and natural flooding areas, now in place, along the navigable rivers is the best environmental and wildlife producing system that has ever existed.

Robert, Benoit, Simon Forget, and Jean Rousselle. (2001). ***The Effectiveness of Flood Damage Reduction Measures in the Montreal Region*****. Montreal, Quebec: Risk and Performance Group, Department of Civil, Geological and Mining Engineering, Ecole Polytechnique de Montreal.**

Keywords:
floodplain management, economic impacts, mitigation, Quebec, Canada

Abstract: This study assesses the effectiveness of two flood damage reduction measures -- designation and diking of floodplains. The study was carried out in four Quebec municipalities located on the shores of Lac des Deux-Montagnes and Rivière des Mille-Iles, namely Sainte-Marthe-sur-le-Lac, Saint-Eustache, Rosemère, and Bois-des-Filion. Criteria for selecting the study areas included area of the flood-risk zone, presence or absence of dikes, presence or absence of buildings, and availability of data. The study areas were selected with the help of flood risk maps of the Greater Montreal region. In each area, information on the number of buildings and their economic value was taken from the municipality's property assessment database. Trends in the occupancy and value of floodplains were identified and compared. The results of the study show that, as in other regions of Canada, measures to reduce flood damage based on designation and mapping of floodplains have had no impact on occupancy, have failed to reduce flood damages, and have not halted increases in such damages.

Robinson, Michael E. (1989). ***The National Flood Insurance Program and Floodplain Development*****. Unpublished working paper. Washington, DC: FEMA.**

Keywords:
building codes, development, wetlands, NFIP

Abstract: Robinson identifies six points that are important in any discussion of the impact of the NFIP in development: (a) because new construction is actuarially rated, there is no insurance "subsidy" for property that was not already in place when the community was first mapped; (b) added costs associated with NFIP building standards and insurance premiums should discourage floodplain development provided that alternative flood free locations are available; (c) in a few instances, the NFIP may "enable" development by making lenders more willing to loan or invest in development. However, given the added costs associated with the NFIP's building standards, this would most likely occur only when the proposed development has high recreational value or where undeveloped flood free property is scarce; (d) wetland losses are primarily due to agricultural and commercial or industrial development neither of which are affected by the availability of flood insurance; (e) the NFIP's requirement that communities designate a regulatory floodway and prohibit development within that floodway that would cause any increase in flood heights provides significant protection to river corridors; and (f) the NFIP's building standards improve the overall quality of development when it does occur. Empirical evidence, according to the author, does not support a conclusion that flood insurance is critical to coastal development.

Roenigk, Dale J. (1993). Federal disaster relief and local government financial condition. *International Journal of Mass Emergencies and Disasters*, 11(2), 207-25.
Keywords:
disaster assistance, public assistance
Abstract: Federal relief for local governments following natural disasters is provided under the assumption that without aid disasters might overwhelm local resources thus slowing recovery. Using loss data for a sample of counties experiencing disasters in the mid-1980s, this paper provides evidence that the financial condition of local governments was not improved by receiving federal aid. Additionally, the paper shows that the initial financial impacts of disasters may be negative, but that within two years the net effect is positive.

Rosen, H. and M. Reuss, eds. (1986). *Flood Control in Urban Areas: Past, Present and Future*. Proceedings of a National Symposium, New Orleans, LA, September 26, 1986. Chicago, IL: Public Works Historical Society.
Keywords:
history, urban areas, flood control
Abstract: This book summarizes the proceedings of the National Symposium, Flood Control Challenge: Past, Present, and Future held on September 26, 1986. This symposium commemorated the fiftieth anniversary of the 1936 Flood Control Act and was sponsored by the Public Works Historical Society and the Army Corps of Engineers in cooperation with the American Public Works Association's Institute of Water Resources and Council on Emergency Management. The proceedings are arranged in three parts; Part I: The 1936 Flood Control Act, Part II: Impact on Rural and Urban Areas, and Part III: The Economics of Flood Control. Chapters of particular interest are: "Evolution and Future of Flood Control," by T.M. Schad; "Flood Control in Urban Areas: Past, Present, and Future," by B. Steinberg; and "When May a Post-Audit Teach Lessons?" by Gilbert F. White.

Rucker, Robert E. (1986). Rationality and legitimation: A study of the National Flood Insurance Program. *Dissertation Abstracts International*, 46(10).
Keywords:
history, NFIP
Abstract: This dissertation analyzes the historical development and present workings of the NFIP. The NFIP is the result of the federal government's continued involvement in flood control, which dates back to the early 1800s. The NFIP is a response to the inability of structural measures to prevent increases in flood damages. Historical data were analyzed for themes and sensitizing concepts which were then used to guide the second stage of data gathering using field work based on interviews, observations of public and private meetings, and current periodicals. This primary data were analyzed using the themes, sensitizing concepts, and Jurgen Habermas's theoretical work on late capitalism. The case demonstrated problems of rational administration, economics, and legitimation as the federal government has implemented the NFIP.

Salvesen, David and David R. Godschalk. (1998). *Development on Coastal Barriers: Does the Coastal Barrier Resources Act Make a Difference?* Washington, DC: The Coastal Alliance.
Keywords:

Coastal Barrier Resources Act, coastal barriers, development, Alabama, Florida, North Carolina, South Carolina, environmental policy, public policy, subsidies

Abstract: This report evaluates the impact of the Coastal Barrier Resources Act (CBRA) on development in coastal barriers and has three objectives: to determine whether the availability of federal funds encourages construction in coastal areas; to determine whether restrictions under CBRA have been adhered to by the federal government; and to determine what would be the real, unsubsidized cost of coastal development, i.e., the added cost of development when developers have to pay for private roads, water and sewer systems, insurance, and/or bridges. The report discusses the act's purposes and history, reviews the relevant literature, and provides both a qualitative (case studies) and quantitative analysis of CBRA's impact. To conduct the evaluation, the authors visited coastal barriers in four states—Alabama, Florida, North Carolina, and South Carolina. At each site, the authors conducted interviews with key stakeholders and selected a random sample of parcels from CBRS and non-CBRS areas. In addition, where possible, the authors estimated the total number of dwellings, single-family houses, and condominiums constructed since the adoption of the act. Overall, the report makes several important conclusions: (1) where state and local government actions and policies support the objectives of CBRA, little or no development occurred in the CBRS unit; (2) state and local government subsidies were often substituted for federal subsidies, thus undermining the intent of CBRA; (3) infrastructure investment by the private sector has enabled development to occur in CBRS units; and (4) in the areas sampled, parcels in CBRS were less likely to be developed than parcels in non-CBRS areas within the same coastal barrier.

Salvesen, David Anton. (2002). ***Land Use Change in the Coastal Barrier Resources System: The Effects of Conservation and Development Advocacy Coalitions*****. (Ph.D. dissertation, University of North Carolina at Chapel Hill).**

Keywords:
Coastal Barrier Resources System, coastal areas, development

Abstract: Using five case studies of selected Coastal Barrier Resources System (CBRS) units as well as surveys of state coastal managers and key informants, the author asked (a) the extent to which the Coastal Barrier Resources Act (CBRA) has limited development in CBRS units, (b) the ways in which policies and actions of state and local governments affect the development of CBRS units, and (c) the extent to which advocacy coalitions account for the difference in the level of development among certain CBRS units. Salvesen concludes that CBRA, by itself, will not prevent development from occurring in CBRA-designated areas. In fact, it appears that development in CBRS units will occur if development pressure is strong enough to overcome the disincentives posed by CBRA and state and local governments facilitate development in CBRS units. On coastal barriers that are readily accessible, where the real estate market is strong, and where most of the non-CBRS units have already been developed, CBRA may only be delaying the inevitable. However, government policies and advocacy coalitions can play a crucial role in shaping development in CBRS units. The paper suggests the following policy revisions: (a) ensure that federal agency actions are consistent with the act's objectives should be delegated to a single agency, (b) appoint an official arbiter for interagency disputes, (c) incorporate the CBRA's goals into local coastal zone management plans, (d) improve outreach, and (e) limit federal spending for infrastructure on coastal barriers if it will encourage development in a CBRS unit.

Scanlon, T. Joseph. (1988). Winners and losers: Some thoughts about the political economy of disaster. *International Journal of Mass Emergencies and Disasters*, 6(1), 47-63.
Keywords:
economic impacts, public policy, disaster assistance
Abstract: While it is obvious disasters are negative events causing injury and death, damage, and destruction, macroeconomic studies show little long-term economic effects from disaster. That is because disasters create both losers and winners, and these balance out. Who loses and who wins is not random but a result of public policy decisions. The losers include individuals who are injured, lose their jobs, lose their homes, lose a wage earner, or lose a place of residence. The winners include individuals who earn extra money because they are involved in emergency response or restoration. They include wage earners and their families as well as some businesses, but not others. They include communities that, because of substantial assistance, end up better off because of the disaster. Winners and losers are created by decisions about where to build a dam or who should receive what sort of assistance. This article is not based on new research but on an analysis of existing material. The author concludes that more research is needed on the economic effects on individuals, businesses and communities, and on the economic impact of policy decisions.

Schaefer, Karl A. (1990). The effect of floodplain designation/regulations on residential property values: A case study in North York, Ontario. *Canadian Water Resources Journal*, 15(4), 319-32.
Keywords:
Ontario, Canada, property values, economic modeling, urban areas, socioeconomic impacts, floodplain designation
Abstract: This study investigates the effect of floodplain designation and regulations on residential property values in an established residential neighborhood on the Don River in North York, Ontario. This area was designated under the National Flood Damage Reduction (FDR) Program in 1982, and adopted as a Special Policy Area (SPA) in 1984. Various forms of a hedonic regression price model are utilized to identify the influence of designation/regulations on selling price. The model employs individual property attribute data, available through the Multiple Listing Service. A preliminary model indicates that location and designation/SPA formulation contribute minimally to sale price. Conversely, under the land comparison technique, designation moderately depresses and SPA regulations positively influence property values. Overall, the results are mixed, inconclusive, and highly dependent on the specific analytical model.

Schneider, William J. and James E. Goddard. (1974). *Extent and Development of Urban Flood Plains.* Washington, DC: US Geological Survey.
Keywords:
development, urban areas
Abstract: This study evaluates both the amount of floodplain in urban areas and the degree of development of these floodplains for 26 communities in the United States. The amount of urban area in floodplains ranges from 2.4 percent in Spokane, WA, to 81 percent for Monroe, LA. The median value is 10.5 percent, and the weighted average is 16.2 percent. The amount of development on these floodplains also varies widely, from 11.3 percent for Lorain-Elyria, OH, to 97 percent for Great Falls, MT. The median value is 57 percent, and the weighted average is 52.8

percent. Attempts to correlate either the extent of urban area in floodplain or amount of development with three readily available indices—depth of flooding, precipitation, and physiography—showed no strong relationships. Some correlation was found between the extent of urban area in floodplain and index depth of flooding.

Schmidt, Charles W. (2000). Lessons from the flood: Will Floyd change livestock farming? *Environmental Health Perspectives*, 108(2), A74-7.
Keywords:
Hurricane Floyd, North Carolina, agriculture, environmental protection
Abstract: This article discusses the regulatory and policy implications for the swine industry in North Carolina in the aftermath of Hurricane Floyd. The swine industry was responsible for most of the flood-related environmental damage sustained during Hurricane Floyd. As part of an emergency waste-management plan, waste-management systems that sustained more than 50 percent damage will not be permitted to rebuild in the 100-year floodplain. Environmentalists and others contend that a massive hog farm should not be located in a low-lying area that is vulnerable to flooding and ecologically sensitive, but state officials are unwilling to provide any definitive answers as to whether regulatory changes to swine farming will ensue to accommodate future flood conditions.

Schwab, Jim, Kenneth C. Topping, Charles C. Eadie, Robert E. Deyle, and Richard A. Smith. (1998). *Planning for Post-Disaster Recovery and Reconstruction*. Chicago, IL: American Planning Association.
Keywords:
Midwest floods of 1993, natural disasters, disaster planning, flood disaster planning, mitigation, disaster assistance, hazard identification, risk assessment
Abstract: FEMA provided funding for this report and asked the American Planning Association (APA) to write and publish it as a form of outreach to the planning community. The document can help community leaders and planners educate their constituents on how informed decisions and choices can affect the rebuilding process and yield a safer, more sustainable community. The report introduces planners to their roles in post-disaster reconstruction and recovery, and provides guidance on how to plan for post-disaster reconstruction side by side with all the other players involved (city/county managers, business owners, and others). A key theme throughout this report, and one that should be equal in importance to community recovery, is the need to rebuild in such a way as to create a community that is more resistant to future disasters. Hazard mitigation is crucial to the long-term sustainability of communities, and therefore must be considered as important as other traditional planning considerations when making development decisions. This report is essentially divided into two parts. How-to information is presented in the first, and background information, cases studies, and appendices are presented in the second.

Seydlitz, Ruth J., William Spencer, Shirley Laska, and Elizabeth Triche. (1991). The effects of newspaper reports on the public's response to a natural hazard event. *International Journal of Mass Emergencies and Disasters*, 9(1), 5-29.
Keywords:
risk communication, risk perception, Mississippi River, Louisiana, media
Abstract: The literature on environmental hazards suggests that media reports constitute a major source of information on which people base their responses. However, the effect of media reports

on responses is neither direct nor simple. Variables such as prior experience, the responses of others, selectivity in attention, and characteristics of the content of media reports interact to influence responses. On the basis of the extant literature on media and hazards, the authors constructed a model of the effect of media reports on the public's response to a natural hazard event. The authors test various hypotheses derived from this model by examining a salt water intrusion in the Mississippi River that affected drinking water in the New Orleans metropolitan area in the summer of 1988. Using time series analysis, the article examines the effect of various characteristics of local newspaper stories on bottled water sales throughout the intrusion period. The results suggest that in the absence of personal experience, people are more likely to respond to media reports regardless of personal relevance or seriousness of the consequences of the hazard events reported by the media. When people possess personal experience, they are more selective in their attention and response to media reports. The results also suggest that people used media reports of others' behaviors as cues to appropriate responses. Finally, the report concludes with a discussion of the conceptual and methodological implications of these results for future research.

Shabman, Leonard A. and Demetrois I. Damianos. (1976). Flood-hazard effects on residential property values. ***Journal of the Water Resources Planning and Management Division,*** **102(1), 151-62.**

Keywords:
Virginia, property values, economic modeling, risk perception, structural approaches, nonstructural approaches, socioeconomic impacts, zoning

Abstract: This paper reports on the results of an investigation of the hypothesis that the existence of flooding has a detrimental effect on residential land values. No reason was found to reject this hypothesis. The hypothesis that structural measures (flood control) enhance property values was not rejected although the evidence was limited to one case study. Finally, attempts to assess the hypothesis that nonstructural measures like zoning depress property values were not conclusive. The results also suggest some possible general conclusions. In the case of Radford, VA, the estimated equations suggest that the elimination of flood risk is something that ultimately gets built into prices in a uniform way. However, the inability to develop a strong explanatory regression equation for sales of land in the floodplain in Alexandria, VA, suggests a high degree of unexplained variation in sale prices. Such variability may actually stem from purchasers' ignorance of the flood risk in the area or from a difference in the willingness to take such risks, although the results show that average sale prices are lower in the floodplain than in comparable flood-free areas. Thus, the removal of uncertainty has a predictable effect on price.

Shabman, Leonard and Kurt Stephenson. (1992). The possibility of community-wide flood control benefits evidence from voting behavior in a bond referendum. ***Water Resources Research,*** **28(4), 959-64.**

Keywords:
attitudes, Virginia, flood control

Abstract: Voting behavior in a referendum on flood control in Roanoke, VA, provides evidence that people living and working outside the flood-prone area are willing to pay for the construction of flood control projects. This voting behavior supports the argument that flood control benefits exist at the community level. In providing the cost sharing required under recent federal legislation, local government financing that distributes project costs over the whole

population of a local jurisdiction, and not just those persons living or working in protected areas, may increase both economic efficiency and expand communities' financial capacity to pay for such projects.

Shabman, Leonard. (1994). Responding to the 1993 flood: The restoration option. *Water Resources Update*, 95(Spring), 26-30.
Keywords:
wetlands, environmental restoration, public policy
Abstract: This article takes a critical perspective on the restoration of floodplains. It describes how the nation's goals for its wetlands and floodplains have changed over time from development to preservation and, now, to ecosystem restoration. It states that effective policy analysis must go beyond the easy rhetoric of saying that the 1993 flood revealed "failed policies." Analyses must demonstrate that continued agricultural land use imposes costs that are greater than their values, and that the society is willing and able to implement policies to restore the lands. It comments on analytic and financing challenges for advancing a national restoration agenda and concludes that the policy question posed by the 1993 flood is whether the nation wishes to reverse the long standing policies that have encouraged the occupancy of floodplains and the drainage of wetlands and pursue a restoration agenda.

Shabman, Leonard and Kurt Stephenson. (1996). Searching for the correct benefit estimate: Empirical evidence for an alternative perspective. *Land Economics*, 72(4), 433-49.
Keywords:
property values, cost-benefit analysis, economic modeling, public policy
Abstract: This paper contrasts the results of the valuation techniques of contingent valuation, hedonic price, and property damages avoided. Each technique was used to estimate the value of flood risk reduction from the construction of a flood control project. Voting behavior in a referendum called specifically for the provision of the project was used to further interpret the results from the three valuation studies. The authors found substantial differences between the estimates. The authors suggest economists should apply the estimation technique that best facilitates a collective choice process. An acceptable benefit estimation technique does not have to measure all possible effects in direct accord with theoretical willingness-to-pay logic, instead the decision-participants must believe that the estimate reflects some salient feature of a choice. It also means that the estimate needs to be understood to those who might use it. For instance, the Property Damages Avoided (PDA) technique could be a useful benefit estimation technique for a variety of reasons (understandable logic and limitations), none of which is based on the argument that it is an accurate or comprehensive measure of the benefits of flood control. In contrast, while contingent valuation methods (CVM) are theoretically capable of establishing the willingness-to-pay for the entire range of environmental use, CVM may provide little useful policy information, sometimes even generating more controversy than application in decision-making. The authors conclude that to be effective in public policy, economists have to become more attentive to what techniques, advice, and analyses are useful to those involved in making choices. Policy economists will be ineffective if they cling to the notion that there exists a "correct" benefit estimate and that their professional responsibility is to measure it under any circumstances.

Sheaffer & Roland, Inc. (1976). ***Case study of Padre Island National Seashore: Supporting Study for Barrier Island Development Near Four National Seashores*****. Geneva, IL: Sheaffer & Roland, Inc.**
Keywords:
development, Hurricane Beulah, Texas, subsidies, wind
Abstract: This study provides a chronology of events that influenced a surge of development in the most southern portions of Padre Island, TX. The availability of flood insurance is one of several factors identified in the growth of neighboring communities. At about the same time as the NFIP was enacted, the state legislature created the Texas Catastrophe Property Insurance Association (now known as the Texas Windstorm Insurance Association), which guaranteed windstorm and hail insurance to Texas coastal communities. Of the two programs, the windstorm pool coverage clearly presented the largest exposure. Also, the authors said that another large influence on development came in 1967 during the aftermath of Hurricane Beulah. This hurricane destroyed mostly substandard structures, clearing the way (literally) for more storm-proof development. The authors conclude that while the NFIP represented the first occurrence of federal subsidization of development in South Padre Island, the impact of the availability of flood insurance is difficult to discriminate from the impact of the availability of wind and hail insurance and the impact of Hurricane Beulah.

Sheaffer & Roland, Inc. (1981). ***Barrier Island Development Near Four National Seashores.*** **Washington, DC: Sheaffer & Roland, Inc.**
Keywords:
property values, coastal barriers, development
Abstract: This report focuses on the impact of public land acquisition on land values on adjacent barrier islands and mainland communities. To address the topic, the authors select and analyze four seashores on the southeast Atlantic and Gulf Coasts. The report found that increases in real estate values in communities adjacent to the seashores were not determinable. Also, convenient access by road, bridge, or causeway did not immediately lead in every case to extensive development in the adjacent community. In all of the case studies, initial development of road access was financed by private, local, and state interests. Federal participation came later. Wastewater management and freshwater supply were among the major constraints on further development. Acquisition costs of the seashores studied ranged from $75.35 to $4,950 per acre. However, even using an average purchase price of $5,000 per acre, acquisition costs could be one-fifth or less of the costs to the federal government of continuing current development programs on the undeveloped barrier islands. Cost-effectiveness will be maximized if public acquisition occurs before development, if possible. The report concludes that public acquisition of the islands is cost effective and the surest means to protect barrier islands from inappropriate development.

Sheaffer, John R., J. David Mullan, and Nathan B. Hinch. (2002). Encouraging wise use of floodplains with market-based incentives. ***Environment,*** **44(1), 32-43.**
Keywords:
NFIP, floodplain management, flood control, environmental policy, public policy, zoning, development, environmental impacts, economic impacts, Community Rating System
Abstract: This article describes how market-based incentives can encourage private interests to implement sustainable development and ultimately achieve wise use of floodplains. After

explaining the evolution of flood control policies and why these traditional approaches have failed, the authors discuss the need for a broader understanding of the wise use of floodplains. This approach emphasizes the economic, social, and environmental benefits of multipurpose floodplain management as well as the costs of correcting past mistakes of land-use. Market-based incentives can be incorporated into overall floodplain management efforts to help create a more multipurpose approach and to attain the goal of wise use. An incentives-based approach to floodplain management seeks to identify relationships among regional and environmental factors and to incorporate solutions of multiple economic and environmental benefits. Development credits represent one way to incorporate market-based incentives into floodplain management. For example, the public benefits associated with the wise use of floodplains can be credited to owners and developers by allowing them to build more housing units in a development in an appropriate area. The authors then discuss examples of current programs and projects using incentives including CRS.

Sheaffer, John R. (1967). *Introduction to Floodproofing: An Outline of Principles and Methods*. Chicago, IL: Center for Urban Studies, University of Chicago.
Keywords:
mitigation, floodproofing, nonstructural approaches, structural approaches
Abstract: Floodproofing consists of those techniques for preventing flood damage to a structure and the contents of a building in an area subject to flood hazards. This publication is intended to acquaint public officials, building owners, and professionals with the essential principles and to outline and illustrate simple but effective measures for reducing the damages caused by flooding. The report can serve as an outline for engineers, architects, and other professionals of the problems associated with either preventing entry of water into buildings or minimizing the damages from flooding. Chapter topics include the uses and limitations of floodproofing, the physical environment and types of floodproofing, procedures for floodproofing, structural engineering aspects of floodproofing, and programs of floodproofing.

Shepard, Richard C. (1994). Floodplain development: Lessons learned from the great flood of 1993. *Urban Land*, 53(3), 19-24, 42, 44.
Keywords:
Midwest floods of 1993, hundred-year flood standard, property values
Abstract: This article says that the Midwest floods of 1993 “caught many business executives off guard – unaware of the flooding danger, the need for flood insurance, or what steps they should take in a flood emergency.” The author takes exception with the use of the term “100-year floodplain” saying it is misleading and creates a false sense of security. While it is difficult to quantify the effect of flood or fear of flooding on the real estate market, property values take a “major hit” after a flood. According to the author, it would take rebuilding levees to the 500-year floodplain level to reinstate market values of land to the levels prior to the Great Flood.

Shilling, James D., C.E. Sirmans, and John D. Benjamin. (1989). Flood insurance, wealth redistribution, and urban property values. *Journal of Urban Economics*, 26(1), 43-53.
Keywords:
Louisiana, property values, subsidies, pre-FIRM structures, urban areas, economic modeling
Abstract: This paper examines the economics of the wealth transfer created by the NFIP. By its very nature, the NFIP is unique in that it subsidizes existing properties but not new construction.

Thus for comparable properties, the gain captured by existing homeowners is the difference between selling prices of equivalent qualified and nonqualified properties. Using standard hedonic pricing models, the authors empirically test the impact of subsidized and nonsubsidized flood insurance on property values in Baton Rouge, LA. Results demonstrate that floodplain location causes a significant discount on properties eligible for subsidized flood insurance. This wealth redistribution simply adds to the total cost of transferring subsidized housing units.

Shipley, Sarah. (2003). Missouri lacks rules on flood plain development. *The St. Louis Post-Dispatch*, July 27.
Available at:
http://www.stltoday.com/stltoday/news/special/flood93.nsf/front?openview&count=2000
Keywords:
attitudes, awareness, buyouts, development, economic impacts, environmental impacts, flood control, flood damage, floodplain management, hundred-year flood standard, insurance purchase decision, levees, mapping, Midwest floods of 1993, Missouri, NFIP, public policy, risk perception, Special Flood Hazard Areas, zoning
Abstract: This article addresses concerns about a lack of state oversight of floodplain development in communities. Missouri, like about 20 other states, does not have a statewide floodplain management program, but instead relies on communities to voluntarily participate in the NFIP and adopt the program's standards. The article quotes representatives from organizations such as the Missouri Coalition for the Environment and the Great Rivers Habitat Alliance, which are critical of what they see as inadequate management of the state's floodplains. The article points to other states that use regulations to control floodplain development. Some states mandate local participation in the NFIP, oversee levee construction, formulate policy based on anticipated or future development, and require standards that exceed those required by the NFIP such as freeboard or wider floodways. The article is part of a series of more than 20 articles published by *The St. Louis Post-Dispatch* in July 2003 to examine the state of areas affected by the Midwest floods of 1993. Other articles address construction removed from the floodplain by levees, programs to buyout properties in the floodplain, increased development within the floodplain, and perception of flood risk.

Sierra Club. (2000). *Permitting Disaster in America: How Reforming "Rubber Stamp" Wetland Destruction Permits Will Protect Your Family from More Flood Risks*. Madison, WI: Sierra Club Midwest Office.
Available at: http://www.sierraclub.org/wetlands/reports/flooding/
Keywords:
wetlands, Army Corps of Engineers, environmental protection, permits, flood damage, mitigation, flood control
Abstract: This report shows that floodplain sprawl and wetland destruction are causing more flood deaths and damage across the country. According to the Sierra Club, the Army Corps of Engineers approved 99 percent of developers' requests between 1988 and 1996 for permits to destroy wetlands. This rate of approval occurred even in states with high flood risks. Floods killed 957 and destroyed $45-90 billion in property from 1989 to 1998. North Dakota leads the nation with 15 counties declared disaster areas five times between 1989 and 1998. King County, WA, and Jefferson County, IN, had flood disasters on seven separate occasions. The report also shows that "rubber stamp" wetland permits allows developers to build on and destroy 78,000

acres of wetlands, enough to store 78 billion gallons of floodwater or about 24,000 flood control dams, between 1988 and 1996. Meanwhile, FEMA and state agencies paid $500 million to move more than 17,000 residential and commercial structures out of floodplains after floods between 1988 and 1998. Data from the Army Corps of Engineers show that 40 percent of the destruction of wetlands from 1988 to 1996 occurred with Nationwide Permit 26, which allows developers to destroy up to three acres of isolated wetlands.

Simmons, K. M. and J.D. Kruse. (2000). Market value of mitigation and perceived risk: Empirical results. *Journal of Economics*, 26(1), 41-51.
Keywords:
mitigation, Texas, wind
Abstract: This paper explores the value of windstorm mitigation in a city on the Gulf Coast. Policymakers have long assumed that agents will not voluntarily mitigate for a natural disaster. Consequently, policy has focused on coercive measures. The study contains detailed information on the inclusion of storm-blinds, a specific hurricane mitigation feature. Homes with storm-blinds command a premium compared to homes without this feature, thereby questioning the assumption held by policymakers. This result, however, is limited to homes located on the island portion of the community indicating that agents differentiate the risk from one area to another.

Simmons, Malcolm. (1988). *The Evolving National Flood Insurance Program*. Washington, DC: Congressional Research Service.
Keywords:
coastal barriers, development, coastal areas, NFIP
Abstract: This brief overview of the NFIP explains that one of the more volatile issues for the NFIP has been whether it should provide any form of incentive for development of coastal barriers. It became apparent to Congress that a variety of factors were producing growing pressure for the development of these fragile areas. These factors not only included construction of infrastructure but also the availability of flood insurance through the NFIP. Eliminating the availability of federal flood insurance for new construction in these areas would remove one of these incentives to develop.

Singer, Saul Jay. (1990). Flooding the Fifth Amendment: The National Flood Insurance Program and the "Takings" clause. *Boston College Environmental Affairs Law Review*, 17(2), 323-71.
Keywords:
takings, legal issues and litigation, NFIP
Abstract: The author examines the potential impact of US Supreme Court rulings on the constitutionality of the NFIP. Between early 1987 and 1990, the Supreme Court decided three important cases involving the key question of what constitutes a taking of interests in real property under the Constitution. The author discusses the Fifth Amendment debate over the NFIP's takings clause, the nature and extent of flood hazards in the United States, and a brief history of the NFIP. The author concludes that there are few "new" practical results emerging from the Supreme Court's "takings trilogy" of 1987 that impact on the NFIP. As the result of the takings trilogy, it is expected that the courts will scrutinize more closely both the regulatory purpose underlying laws affecting land use and the nexus relationship of statutes to purported regulatory goals. However, the NFIP has little cause for the constitutional fear engendered in

some circles by the three decisions. Considering the hundreds of flood hazard-related land-use regulations upheld by the courts compared to the handful of those overturned, it is more than likely that the courts will continue to sustain soundly conceived and fairly administered floodplain regulations and loss-mitigation statutes.

Skantz, Thomas R. and Thomas H. Strickland. (1987). House prices and a flood event: An empirical investigation of market efficiency. *The Journal of Real Estate Research*, 2(2), 75-83.

Keywords:
Texas, property values, economic modeling, insurance, subsidies, urban areas, housing markets

Abstract: This paper provides evidence about the pricing efficiency of residential real estate markets by comparing home prices before and after a flood for two contiguous locations—a flooded and an unflooded (control) subdivision in Houston, TX. If the flood conveys the initial signal that the subdivision is flood-prone, then an efficient market will depress prices with no subsequent recovery. In contrast, if the flood simply confirms a recognized fact, no price response will ensue. Alternatively, as maintained by local real estate professionals, prices in the flooded subdivision will decline immediately after the flood. Then, as the market forgets the flood, prices gradually rise to original levels. This latter sort of price behavior is patently inefficient. The findings indicate that prices in the flooded subdivision do not decline relative to the local market immediately after the flood. Apparently the information conveyed by the event is already reflected in home prices. However, when insurance rates increase markedly approximately one year later, the higher rates are capitalized into home values and prices fall. This evidence is consistent with market efficiency.

Smith, David J., John C. Purvis, and Arthur Felts. (1995). Risk communication: The role of the South Carolina State Climatology Office. *Bulletin of the American Meteorological Society*, 76, 2423-31.

Keywords:
risk communication, Hurricane Hugo, South Carolina, weather

Abstract: The federally supported state climatologist program ended in 1972. Thereafter, most states supported these endeavors in coordination with the National Climatic Data Center, but the current state programs vary widely. One of the functions of state climate programs that evolved since 1972 is acting as a liaison between the National Weather Service and various state agencies. This role was most apparent and controversial in coordinating state and local government response to severe weather and extreme climate anomalies such as droughts, floods, winter storms, and tropical cyclones. The activities of the climate office in South Carolina during Hurricane Hugo in September 1989 and the October 1990 floods revealed how these interactions occur in one state that mandated these activities. The state climate office had to react to shifting weather conditions and to variable political conditions that affect public organizations. The climate office in South Carolina acts to interpret weather information, develop scenarios and predictions, and assist in post-event damage surveys. This review acknowledges and documents the expanding role of the state climate office in South Carolina in response to state and local government needs for weather forecast interpretation and expert guidance in the event of severe weather.

Smith, D.I. (1998). Urban flood damage under greenhouse conditions: What does it mean for policy? *Australian Journal of Emergency Management,* 13(2) 56-61.
Keywords:
Australia, weather, flood causes, flood damage, environmental impacts
Abstract: The last decade has seen the first tentative steps to assess the socio-economic impacts of greenhouse-induced climates on communities. This article estimates possible flood damages for three flood prone urban communities in Australia using climate change scenarios adopted by the Intergovernmental Panel on Climate Change (IPCC) in 1996. According to the models, all three locations would see a marked increase in the average annual direct flood damage under the worst-case scenario (doubling of present-day CO_2 levels). Furthermore, more frequent flooding could potentially cause a sharp increase in the number of flood prone structures. In response to these estimates, the authors discuss two possible approaches to greenhouse policy: the "no regrets" option and the "precautionary principle." The "no regrets" option can be regarded as measures worth doing anyway, whereas the "precautionary principle" can be regarded as additional investment that would not have otherwise been invested. The authors recommend policy changes based on the "no regrets" and "precautionary principle" despite the uncertainties and lack of local detail in the greenhouse scenarios and the problems of estimating the frequency of extreme events.

Soule, Don M. and Claude M. Vaughan. (1974). Flood protection benefits as reflected in property value changes. *Water Resources Bulletin*, 9(5), 918-22.
Keywords:
Kentucky, urban areas, flood control, economic modeling, property values
Abstract: Measuring flood control benefits from estimated property damage in prior floods omits losses in the form of depressed values of land put to less valuable uses because of annual flooding. Covariance analysis of real property values in three urban areas differently situated around Lake Cumberland, KY, shows a much larger rate of increase, over a 15-year period, for the area receiving flood protection. This result suggests that the economic benefits from a flood protection facility (dam) include these additional property value increases as well as the prevented property damage.

Sparks, Richard E. and Ruth Sparks. (1994). After floods: Restoring ecosystems. *USA Today Magazine*, 123, 40-3.
Keywords:
environmental restoration, floodplain management, agriculture, cost-benefit analysis, riverine areas, Mississippi River
Abstract: This article focuses on the proposals for an aquatic ecosystem restoration of the floodplains in the United States. It offers an alternative to rebuilding of agricultural levees and discusses the restoration of the natural services of floodplains. It reviews the modification of federal programs to protect life, property, and the improvement of the ecosystems of the Upper Mississippi River. The article suggests that although floodplain agriculture may be profitable from a farmer's perspective, no one really knows whether it is sustainable and cost-efficient from a national perspective. The article questions whether it is necessary to subsidize flood protection on flood-prone lands and irrigation on arid lands when production is so high on prime farmland with more moderate moisture conditions that farmers are paid not to grow crops. According to the article, most of the wetlands in the Midwest have been drained and virtually all the rivers

have been degraded by excessive erosion or sedimentation, there is increasing public demand to preserve what is left and restore at least some of what has been lost. Finally, the article concludes that a revised and more effective national flood management program should include aquatic ecosystem restoration.

Speyrer, J.F and W.R. Ragas. (1991). Housing prices and flood risk: An examination using spline regression. ***Journal of Real Estate Finance and Economics*****, 4(4), 395-407.**
Keywords:
economic modeling, property values, Louisiana, mandatory purchase, housing markets
Abstract: This article examines the impact of flood risk and the mandatory purchase of flood insurance on property values. Using a large data set of almost 2,000 homes sold in the New Orleans, LA, area from 1971 through 1986, the analysis confirms the findings of earlier studies that location in a floodplain reduces property values. The present study, using spline variables to adjust for locational variation in the data and an improved measure of insurance cost, reveals that much of this reduction can be attributed to mandatory flood insurance coverage. Moreover, while unexpected flooding does increase the capitalization of insurance costs, repeated flooding does not seem to reduce property values further.

Stakhiv, Eugene Z. (1995). Floodplain planning and management for extreme floods. Paper presented at the ***United States-Italy Research Workshop on the Hydrometeorology, Impacts, and Management of Extreme Floods,*** **Perugia, Italy, November 13-17, 1995.**
Keywords:
floodplain management, Midwest floods of 1993, public policy
Abstract: This paper presents a brief overview of the Midwest floods of 1993 as the context for understanding the Army Corps of Engineers' responses to the policy and programmatic recommendations in the aftermath of the flood. The paper argues that generally, what is lacking for good decision making is basic information, rather than research. Public policies are being made in the absence of good information in the form of data about flood damages, degree of inundation, and severity and frequency of flooding. The author argues that research is needed to improve and refine existing methods rather than to create entirely new approaches or methods. Finally, much of the research and analysis that is required to act on the recommendations of the "Galloway Report" is to improve the administration and effectiveness of existing programs.

Stedinger, Jery R. (1997). Expected probability and annual damage estimators. ***Journal of Water Resources Planning and Management,*** **123(2), 125-35.**
Keywords:
modeling, risk assessment, Army Corps of Engineers
Abstract: Controversy continues over the relative merits of traditional frequency estimators and the "expected probability" estimator of flood risk that incorporates an adjustment for parameter uncertainty. Both have solid theoretical motivation, but address different concerns. The description of hydrologic risk and uncertainty provided by new risk and uncertainty procedures adopted by the Army Corps of Engineers, and risk-based design procedures developed by others, are shown to be equivalent to the expected probability model in simple cases. A 1995 National Research Council (NRC) report recommended against use of the expected probability model for evaluating expected annual damages and the probability of flooding. In particular, the NRC analysis and the 1989 Amell analysis demonstrated that expected probability estimators yield

risk and damage estimators that generally have large positive biases. Historical arguments and related issues are reviewed. Resolution of this controversy and success of the new Army Corps of Engineers' risk and uncertainty procedures require a clear framework for understanding what is meant by risk, variability, and uncertainty. Such risk analyses can better represent local vulnerability to flooding and the large uncertainty in estimates of expected damages and residual flood risk.

Suhayda, J.N. (1997). Modeling impacts of Louisiana barrier islands on wetland hydrology. *Journal of Coastal Research*, 13(3), 686-93.
Keywords:
coastal barriers, development, Louisiana, modeling, coastal areas, Base Flood Elevation, Hurricane Andrew
Abstract: Management and restoration of natural systems requires the quantitative assessment of the impact and cost effectiveness of management alternatives. This paper describes the methodology used in Louisiana to evaluate the role of barrier islands in influencing wetland hydrology and some preliminary results. The objective of the evaluation was to determine the effect of barrier island geometry on the duration and depth of inundation of coastal wetlands under average and extreme conditions. The model selected for use was the overland flooding model developed by FEMA to predict hurricane flood elevations for the NFIP. The model uses an explicit, two-dimensional, space-staggered, finite-difference scheme to simulate the flow of water caused by tides and wind systems. The current size of the inlets between the islands is several times the equilibrium area based upon the tidal prisms. Slight reductions in the cross sectional areas of the inlets between the islands had only a very minor effect on reducing the depth and duration of wetland flooding. If the barrier islands were removed from the model, the depth and duration of tidal flooding slightly increased. Under extreme conditions, the island height and inlet size had a significant effect on the depth and duration of wetland flooding. Hurricane Andrew produced a maximum surge elevation at Cocodrie of about 2.7 m. The predicted surge elevation at Cocodrie would have been about 0.3 m higher if the present barrier islands were destroyed and would have been as much as 1.2 to 1.5 m lower if the barrier islands were raised and the inlets narrowed.

Susquehanna River Basin Commission. (1984). *Changes in Flood Insurance in the Susquehanna River Basin 1978-1982*. Harrisburg, PA: Susquehanna River Basin Commission.
Keywords:
floodplain management, New York, Maryland, Pennsylvania
Abstract: This report provides statistical data on the population characteristics of the Susquehanna River Basin and the changes in NFIP participation and coverage in a five-year period. Between 1978 and 1982, flood insurance policies in the river basin decreased by over 15,000 or 22.6 percent. In contrast, the amount of insurance coverage per policy increased in the five-year period. Detailed statistics on policy coverage are provided by state, county, and subbasin. The Susquehanna River Basin Commission is an independent water resources agency created amongst the states of Maryland, New York, the Commonwealth of Pennsylvania, and the federal government.

Task Force on Federal Flood Control Policy. (1966). ***A Unified National Program for Managing Flood Losses, Communication from the President of the United States.*** **Washington, DC: Government Printing Office.**
Keywords:
federal programs, Unified National Program
Abstract: This report advocates a unified national program for managing flood losses utilizing federal agencies such as the Army Corps of Engineers, the Department of Agriculture, the Department of Housing and Urban Development, the Geological Survey, and the Environmental Science Services Administration. Federal expenditures in flood protection and prevention by the Army Corps of Engineers and the Soil Conservation Service total $7 billion since 1936 and nearly $500 million annually in 1966. The report states that in its current form, federal flood programs cannot adapt to the increased costs of flood disasters. It recommends improvements in knowledge about flood hazards through standardization of the definition of a flood hazard, determination of the frequency of floods, and collection of flood damage data. Data collection would focus on mapping flood hazard areas, their physical boundaries, and at-risk populations and structures. Federal programs that impact land-use in floodplains, such as transportation and regulation of lending institutions should be modified to reflect the goal of decreasing flood hazards.

Tapsell, Sue M. (1999). ***The Health Effects of Floods: The Easter 1998 Floods in England.*** **Enfield, England: Flood Hazard Research Centre.**
Keywords:
health effects, England, socioeconomic impacts
Abstract: This report examines the health effects of the 1998 Easter flood, a small-scale flood in England, to develop a conceptual model to illustrate a flood's effects on overall well being. To create the model, a list of factors that contribute to the total effects of the flood on health is devised. The report includes a list of all health effects reported by victims. In addition to health effects, the report points out a loss of confidence in authorities following a flood event and says that this further contributes to stress and ill health. The conclusion reached is that the flood disrupted many people's lives, caused stress, and often impacted both physical and mental health. The report states these negative impacts are exacerbated by lack of warning before a flood, and so recommends "a new perspective on flooding" that gives more focus to flood warnings. The report also recommends enhancing support systems for victims.

Technical Mapping Advisory Council. (1997). ***Technical Mapping Advisory Council 1996 Annual Report to the Honorable James Lee Witt, Director, Federal Emergency Management Agency*****. Washington, DC: FEMA.**
Keywords:
mapping, strategic planning, agency operations and management
Abstract: In 1994 Congress passed the National Flood Insurance Reform Act and directed FEMA to establish the Technical Mapping Advisory Council. The Council began its work in 1996 and is charged with providing recommendations to FEMA on ways to improve FIRMs and the mapping process. In this report, the Council set goals in five areas: general, preparation of maps, map determinations, distribution of maps and other information, and communication and public education. These goals reflect the needs and concerns of the customers for NFIP maps and mapping products. The Council also makes several recommendations to FEMA: (1) establish an

archival system for maintaining in perpetuity for historic and legal purposes all FIRMs and supporting technical data; (2) distribute all letters of map change with each map ordered; (3) distribute, in digital form, all certification forms required to be submitted with map revision requests; (4) develop a position on any proposed legislation that delegates letters of map change to entities other than FEMA, and (5) implement newer technologies for the production and dissemination of FIRMs.

Technical Mapping Advisory Council. (1998). ***Technical Mapping Advisory Council 1997 Annual Report to the Honorable James Lee Witt, Director, Federal Emergency Management Agency*****. Washington, DC: FEMA.**
Keywords:
mapping, agency operations and management, strategic planning
Abstract: In 1994 Congress passed the National Flood Insurance Reform Act and directed FEMA to establish the Technical Mapping Advisory Council. The Council began its work in 1996 and is charged with providing recommendations to FEMA on ways to improve FIRMs and the mapping process. In this report, the Council recommends that FEMA improve the process of conducting Flood Insurance Studies (FISs) by streamlining its work with study contractors; improve base maps and review update existing methods, in consultation with the Federal Geographic Data Committee (FGDC); pursue base mapping partnerships with public, private, and nonprofit entities; digitally prepare, produce, and make available all new map products resulting from studies or restudies and physical map revisions; and hold community meetings before, during, and after preparation of a new map product to enable state and local input to and participation in issues and activities related to mapping.

Technical Mapping Advisory Council. (1999). ***Technical Mapping Advisory Council 1998 Annual Report to the Honorable James Lee Witt, Director, Federal Emergency Management Agency*****. Washington, DC: FEMA**.
Keywords:
mapping, agency operations and management, strategic planning
Abstract: In 1994 Congress passed the National Flood Insurance Reform Act and directed FEMA to establish the Technical Mapping Advisory Council (the Council). The Council began its work in 1996 and is charged with providing recommendations to FEMA on ways to improve FIRMs and the mapping process. In this report, the Council recommends that FEMA implement programmatic changes that will improve the accuracy, reliability, and availability of map data; institutionalize the process of assessing 5-year mapping needs; increase efforts aimed to inform the public about the potential for flooding; support the need to improve the national network of stream gages, collaborate with the Army Corps of Engineers to expedite the permit process to comply with Section 404 of the Clean Water Act for maintaining federally-recognized flood-control projects; and focus more attention on the state and local involvement in the mapping process. The Council also discussed FEMA's Map Modernization Plan (MMP) and the relationship of the plan to the Council's congressional mandate.

Technical Mapping Advisory Council. (2000). ***Technical Mapping Advisory Council 1999 Annual Report to the Honorable James Lee Witt, Director, Federal Emergency Management Agency*****. Washington, DC: FEMA.**
Keywords:

mapping, agency operations and management, strategic planning
Abstract: In 1994 Congress passed the National Flood Insurance Reform Act and directed FEMA to establish the Technical Mapping Advisory Council (the Council). The Council began its work in 1996 and is charged with providing recommendations to FEMA on ways to improve FIRMs and the mapping process. In this report, the Council recommends that FEMA take the following steps: (a) encourage and support use of future land-use conditions in calculating floods and delineating floodplain limits; (b) improve floodplain delineations that were derived by approximate study methods and mapped as Unnumbered A-Zones; (c) support the use of the recently issued study guidelines for mapping alluvial fans; (d) develop and implement procedures for including data in products about multiple hazards that pose flood risks and continue to participate in the Open GIS Consortium to provide links to other sites containing retrievable data affecting flood risks; and (e) establish an indexing and retrieval system for archived data.

Technical Mapping Advisory Council. (2001). ***Final Report to the Honorable James Lee Witt, Director, Federal Emergency Management Agency: A Summary of Accomplishments and Recommendations 1995-2000*****. Washington, DC: FEMA.**
Keywords:
mapping, agency operations and management, strategic planning
Abstract: This report encapsulates five years of work done by the Technical Mapping Advisory Council (the Council). It responds to a congressional mandate to evaluate and recommend improvements to the production, distribution, and use of FIRMs and other mapping products prepared by FEMA in support of the NFIP. Although the report makes numerous recommendations, the Council deemed the following recommendations as the most important: (a) acquiring additional financial and technical resources for map programs; (b) building constituent interest and public support for modernizing the mapping program using a process that includes public education and public outreach; (c) building partnerships among various federal, state, and local governments, universities, and the private sector to accomplish NFIP objectives; and (d) creating a fully digital environment for floodplain mapping and all related information.

Technical Mapping Advisory Council. (2001). ***Technical Mapping Advisory Council 2000 Annual Report to the Honorable James Lee Witt, Director, Federal Emergency Management Agency*****. Washington, DC: FEMA.**
Keywords:
mapping, agency operations and management, strategic planning
Abstract: In 1994 Congress passed the National Flood Insurance Reform Act and directed FEMA to establish the Technical Mapping Advisory Council. The Council began its work in 1996 and is charged with providing recommendations to FEMA on ways to improve FIRMs and the mapping process. In this report, the Council recommends that FEMA fund a study leading to recommendations for effective nomenclature to be used in referring to flood potential and severity; develop and support partnerships with other federal agencies, states, local, and regional governments, citizens, and other organizations in the development, updating, and revision of FIRMs; develop and distribute standards, in collaboration with federal and state agencies, on techniques for mapping coastal erosion rates to ensure the credibility of erosion maps; continue to provide specific technical guidance for contractors studying flood risk in communities where ice jam flooding is a concern; and reinvent the Flood Insurance Study (FIS) in various ways.

Finally, the Council noted that fiscal budget limitations continue to constrain implementation of its recommendations and requests that they not be subjected to dormancy.

Tennessee Valley Authority. (1985). ***A Guide to Evaluate a Community's Floodplain Management Program.*** **Knoxville, TN: Tennessee Valley Authority.**
Keywords:
floodplain management, Tennessee Valley Authority, methodology
Abstract: The document is a resource developed by the Tennessee Valley Authority to aid assessment of communities that have limited floodplain management experience. It describes the process used to obtain, record, interpret, summarize, and use information gathered during an evaluation. The document emphasizes a comprehensive and well-documented set of procedures. The procedures contained in the guide have been field-tested in 16 communities in the Tennessee Valley watershed, ranging in population from 4,800 to 170,000. Researchers conducted community evaluations in two-person teams, consisting of a community specialist and a civil engineer. Later evaluation attempted different combinations of evaluator teams to test the transferability of evaluation procedures. The evaluation found that procedures were readily transferable to staffs of regional, state, and federal floodplain management agencies. One evaluator with limited assistance from a community staff person could adequately perform the evaluation. The report concludes that the average time needed to perform a community evaluation was 40 hours for the evaluator, four hours for the local staff person, six hours for clerical support, and two hours for the program manager.

Thampapillai, Dodo and Warren F. Musgrave. (1985). Flood damage mitigation: A review of structural and nonstructural measures and alternative decision frameworks. ***Water Resources Research,*** **21(4), 411-24.**
Keywords:
mitigation
Abstract: Literature from diverse sources such as public expenditure economics, management science, geography, agriculture, and engineering reveals a wide range of decision frameworks for deriving strategies for flood mitigation. This paper reviews these different types of decision frameworks aiming to provide an understanding of these frameworks, along with their relative adequacies and inadequacies. Such an understanding reveals the directions along which the formulation of a more adequate framework should proceed. However, the formulation of a given decision framework is influenced by the types of economic benefits associated with the flood mitigation measures considered in that framework. Hence, the paper reviews the various flood mitigation measures prior to discussing the various decision frameworks.

Thompson, Kay D., Jery R. Stedinger, and David C. Heath. (1997). Evaluation and presentation of dam failure and flood risks. ***Journal of Water Resources Planning and Management,*** **123(July/August), 216-27.**
Keywords:
modeling, risk assessment, dams
Abstract: Safety studies for existing dams have found that some do not satisfy current estimates of the probable maximum flood. An event or influence diagram can describe the random factors that contribute to major inflow floods and that determine reservoir operation and possible downstream damages during a flood event. This allows calculation of the probability of dam

failure and the distributions of damages and loss of life using combinations of various analytical and Monte Carlo methods. This paper discusses the efficiency of different evaluation methods: event trees, simple Monte Carlo sampling, Latin hypercube sampling, importance sampling, and an analytical/stratified Monte Carlo (A/SMC) method. The analysis suggests that the A/SMC method and importance sampling have great potential for the efficient estimation of dam failure risks. Numerical examples employ the distributions of damages and loss of life to show the character of trade-offs presented by different decisions and illustrate problems with the partitioned multi-objective risk method. The use of partial expected damage and loss of life functions is recommended to show the importance of low-probability/high-consequence events.

Thompson, Mark E. and Herbert H. Stoevener. (1983). Estimating residential flood control benefits using implicit price equations. *Water Resources Bulletin*, 19(6), 889-95.
Keywords:
Oregon, property values, economic modeling, flood control
Abstract: An implicit price model relating residential lot value to price-determining characteristics is developed to measure the benefits of a structural flood control project in Sutherlin, OR. Special attention is given to the selection of relevant price determining characteristics of residential lots. Implicit price equations are used to estimate damages with and without flood protection. A dummy variable indicating location in the floodplain quantifies flood damages for the equations. The regression results indicate that residential lots exposed to flood hazards are valued less than lots not exposed to the threat of flooding. Furthermore, the analysis shows that annual flood damages were reduced by $15,275 as a result of the structural flood control project.

Thunberg, E. and Leonard Shabman. (1991). Determinants of landowner's willingness to pay for flood hazard reduction. *Water Resources Bulletin*, 27, 657-65.
Keywords:
flood control, attitudes, Virginia
Abstract: Estimated benefits of flood control projects are typically limited to avoided property damages. However, the possibility that there are benefits from reduced psychological stress among floodplain occupants and benefits to the community has long been recognized. A survey of landowners residing in a floodplain in Roanoke, VA, found that nonproperty considerations helped explain their expressed willingness to pay for flood control. Of particular importance was the respondents' concern for disruption of the community caused by possible flooding.

Throupe, Ron, Bob Freitag and Rhonda Montgomery. (2002). A Reconnaissance Study on the Market Impacts on Elevated Homes in Known Floodplains. Paper presented at the *June 2002 Association of State Floodplain Managers Conference*.
Keywords:
Washington, cost-benefit analysis, economic impacts, property values, structural approaches
Abstract: This study evaluates the effect of elevating a home on its selling price and time on market, compared to nonelevated homes in Snoqualmie, WA. The study concludes that the market price penalized nonelevated homes within the floodplain and that the market price of elevated homes exceeded that of nonelevated homes by 25 to 70 percent of the cost of the retrofit. The difference is a substantial return when compared to the initial investment in retrofitting of 12 to 25 percent and greater than the reduced cost of flood insurance for an

elevated home. While there is some financial gain to the property owner of elevated his home, this gain does not equal the cost of elevating the home. Absent intervention by the state, individual property owners would not elevate flood-prone homes. The implication is that the gains for the community from the reduced need for disaster response and recovery assistance outweigh the individual benefits to the homeowner.

Tiedemann, Herbert. (1999). *Flood Causes, Effects and Risk Assessment.* Collingdale, PA: DIANE Publishing Company.
Keywords:
risk assessment
Abstract: This book provides a descriptive guide to assessing the risk of the flood peril, particularly focusing on river floods. It is designed to help insurers evaluate and differentiate the risks to be covered. The necessary capability in risk assessment requires an understanding of the phenomena and the essential parameters that lead to flooding and that influence damage and losses. This book includes discussion on recent significant flood events, methodology of risk assessment, hazards, vulnerability, flood protection, insurance and reinsurance aspects, other causes of flooding, rainfall data for selected places, a list of major historical floods, and a list of flood related web sites.

Tobin, Graham A. (1995). The levee love-affair: A stormy relationship. *Water Resources Bulletin,* 31(3), 359-67.
Keywords:
floodplain management, Midwest floods of 1993, levees
Abstract: A history of flood control in the United States shows an undying affair with levees. This love affair, however, was put to the test by the record flooding in the summer of 1993. About 70 percent of levees in the upper Midwest failed during this time, leading to extensive damage to both farmland and urban areas. Consequently, there were repeated calls to reassess policies for floodplain management. The report of the Interagency Floodplain Management Review Committee is one outcome of this and it forms the basis of this commentary on levees. In many respects, levees are effective flood control measures, being relatively cheap to implement and easy to build. At the same time, levees have negative impacts, affecting the hydrological regime both up and down stream, and often exacerbating flooding in other places. Furthermore, technical weaknesses in design, planning, construction, and maintenance have all contributed to the failure of some levees. While the report recommends changes in floodplain management to address some of these issues, it is difficult to see how these will materialize given the current political, economic, and social climate.

Tobin, Graham A. and Burrell E. Montz. (1988). Catastrophic flooding and the response of the real estate market. *Social Science Journal,* 25(2), 167-77.
Keywords:
California, property values
Abstract: This study examines the impact of flooding on residential property values. It reviews the literature and produces a theoretical conceptualization which is then applied to the analysis of the 1986 flood in Linda and Oliverhurst, in Yuba County, CA. The authors found support for the premise that flood frequency affects the capitalization process. In other words, the flood is

initially capitalized into housing values but, because of the infrequent nature of the hazard, values are expected to rise, although the time for recovery is not certain.

Tobin, Graham A. and Burrell E. Montz. (1990). Response of the real estate market to frequent flooding: The case of Des Plaines, Illinois. *Bulletin of the Illinois Geographical Society*, Fall, 11-21.
Keywords:
Illinois, property values, housing markets
Abstract: This article investigates two questions: How does the residential real estate market respond to a high probability of flooding? Is there an identifiable pattern that might result in a predictive model of changing floodplain and land values? The authors contend that the more floods experienced the greater is the impact on the housing market and use Des Plaines, IL, as a case study. Using flood histories, impacts of recent flooding, and longer-term trends in the housing market, the researchers found that flood frequency is a valid spatial variable, demonstrated by variation in the recovery periods of housing prices consistent with variation in the flood frequency in those markets. Thus, the researchers conclude that flood frequency is an important variable to consider in evaluating property values.

Tobin, Graham A. and Burrell E. Montz. (1994). The flood hazard and dynamics of the urban residential land market. *Water Resources Bulletin*, 30(4), 673-85.
Keywords:
economic modeling, property values, urban areas, Illinois, California, Pennsylvania
Abstract: Literature on the flood hazard/residential land market relationship is full of contradictory findings, many of which are counterintuitive to the belief that flooding has a negative impact on house prices. This research advances a conceptual framework through which these relationships might be reexamined. Based on the expected utility model, the theoretical framework integrates the economic notion of capitalization with spatial and temporal characteristics of the flood hazard. Four communities with different flood regimes are used to test the effect of flooding on the residential real estate market. Results show that: (a) there is an identifiable relationship between characteristics of the flood hazard and changes in house values; (b) the length of the recovery period is dependent on characteristics and expectations of flooding, attributes of the real estate market, and the availability of capital to fuel recovery; and (c) dynamics of the urban market and spatial extent of the flood hazard influence these relationships. Further research is now necessary to examine these findings under different spatial, temporal, hydrologic, and socioeconomic conditions.

Tobin, Graham A. and Burrell E. Montz. (1997). *The impacts of a second catastrophic flood on property values in Linda and Olivehurst, California*. Boulder, CO: Natural Hazards Center, University of Colorado.
Available at: http://www.colorado.edu/hazards/qr/qr95.html
Keywords:
California, property values
Abstract: The authors assess the relationship between flooding and property values in Linda and Olivehurst, CA, an area that suffered several floods (with impacts first studied in 1986). Following a theoretical framework developed by Tobin and Newton (1986), the authors find that properties that experienced the first flood did eventually recover to near preflood levels, but the

length of time required for recovery varied with depth of flooding (houses with lower flood levels recovered more quickly). Thus, the flood created submarkets that remained identifiable over the long term in part because not all properties in the areas with the greatest flood depths were repaired (the remainders that exist in the communities influence recovery and this perpetuates the submarkets). The 1997 flood further compounded the situation.

Tobin, Graham A. and Thomas G. Newton. (1986). A theoretical framework of flood induced changes in urban land values. ***Water Resources Bulletin,*** **22(1), 67-71.**
Keywords:
property values, urban areas
Abstract: By integrating literature from flood hazard research and urban economics, the authors developed a theoretical structure to explain changes in residential land values following flood events. The negative aspects of the flood hazard are shown to be capitalized in the value of the property. Land values will vary both spatially across the floodplain and temporally depending on the frequency, severity, and spatial characteristics of the flood event. This approach allows for the recovery of the land market value, a novelty at that time. This theoretical approach was later applied in several studies (e.g., Tobin and Montz, 1988).

Toulmin, Llewellyn M., Charles J. Givans, and Deborah L. Steel. (1989). The impact of intergovernmental distance on disaster communications. ***International Journal of Mass Emergencies and Disasters,*** **7(2), 116-32.**
Keywords:
public policy, disaster planning, communication
Abstract: Previous research into disaster communications, while fairly extensive, has been limited primarily to sociological analysis and organizational theory. This body of research, however, has not explored disaster communications in a federal, international, or other multilevel governmental response system. This paper expands upon existing research to present a new theory of intergovernmental disaster communications based on the concept of intergovernmental distance. Intergovernmental distance refers to distance in terms of differing procedures and approaches used by organizations in different functional areas at various levels of government. The theory postulates that the organizational distance created by these differences becomes a critical factor that must be addressed during a disaster. The study employs three sets of dimensions. The first uses two subdimensions and examines distances between functional areas at various levels of government. The second uses three dimensions and considers distances between functional area and central management. The third is multidimensional. It uses a multiple regression equation to analyze intergovernmental distance. The study concludes by addressing the policy implications of the findings, especially the need to overcome inherent intergovernmental distance through disaster planning, the need to recognize the exponential increase in communications problems caused by increases in the number of disaster responders, and the need to determine whether the marginal benefits contributed by each new responder exceed the marginal communications and coordination costs each responder imposes.

Tripp, James T.B. (1994). Flooding: Who is to blame? ***USA Today Magazine,*** **123, 30-3.**
Keywords:
floodplain management, Midwest floods of 1993, wetlands, agriculture, Mississippi River, levees, flood control

Abstract: This article focuses on the proposal to reform policies affecting the Mississippi River's floodplains in the wake of the damage caused by the Midwest floods of 1993. It discusses the impact of the flood on agricultural and urban property owners, the construction of mainstream levees, and the conversion of floodplain wetlands to agriculture. The article concludes that the conversion of floodplain wetlands to agriculture throughout the Mississippi River Basin has been extensive. Eighty percent of the floodplain wetlands of the Lower Mississippi River have been cleared and converted to cropland. Clearing rates in much of the Upper Basin and the Missouri River system have been comparable. Furthermore, the Mississippi River's flood control system of dams, levees, and river training works is tremendous, but not sustainable over the long term: "People have gone too far in severing the river and its tributaries from their floodplains. The message from the floods is that the Mississippi River wants to recapture the floodplains that were historically part of the river. It lies in wait for major flood events to do this." The article concludes: "A program of floodplain restoration would go a long way towards creating a much more sustainable, low-cost flood management system in the Mississippi River Basin than exists today." The article also focuses on the economics behind such a floodplain policy. It suggests that the Army Corps of Engineers must reform how it spends federal dollars on flood control works in the basin, while the federal government expands the Wetland Reserve Program created by the 1990 Farm Act in the Mississippi Basin.

Troy, Austin and Jeff Romm. ***Assessing the Price Effects of Flood Hazard Disclosure Under the California Natural Hazard Disclosure Law (AB 1195)*****. (Draft). Berkeley, CA: California Policy Research Center.**

Keywords:

California, insurance purchase decision, lending institutions, property values

Abstract: This study analyzes the effect of flood hazard disclosure under the 1998 California Natural Hazard Disclosure Law (AB 1195) on property values throughout California. It found that the average floodplain home sold for 4.3 percent less than a comparable non-floodplain home after the passage of the law. Prior to the law, there was no significant price differential between floodplain and non-floodplain homes. The law particularly affected housing prices in Hispanic neighborhoods. Differences in mortgage origination mechanisms between whites and Hispanics appear to account for the effect of racial composition on housing prices. Hispanic homebuyers obtain financing disproportionately from unregulated sources that are not required by FEMA to make flood determinations, or from "subprime" lenders who specialize in high-interest loans to homebuyers with impaired credit histories. Also, Hispanics are more likely to live in floodplains than any other racial group. The results suggest that homebuyers in Hispanic neighborhoods are better informed under the California Natural Hazard Disclosure Law than they were under the NFIP. In terms of national significance, the negative price effect of flood disclosure following the law suggests that NFIP flood disclosure requirements are inadequate.

Tucker, L. Scott. (1979). ***Flood Insurance and Flood Plain Zoning: Water Problems of Urbanizing Areas*****. Henniker, NH: New England College.**

Keywords:

floodplain management, mapping, risk assessment, mitigation, enforcement, compliance

Abstract: A review of the NFIP concludes that sufficient progress is being made and that, in the opinion of the author, both regulation and insurance should continue. The regulatory program in developed floodplains has had a limited effect on flooding, erosion control, and water supply;

results have been more successful in developing floodplains. Persistent problems with respect to the protection of floodplains include: (a) the lack of awareness of flood problems by residents, (b) the lack of adequate data on numbers of people living in floodplains; (c) the effectiveness of floodplain regulations; (d) the difficulty in administering an effective local program in the face of local politics; and (e) the definition of floodplains using existing hydrology when urbanization will influence future flows. Though generally successful, the NFIP has some mixed results. Ways have not been found to manage risk in the fringe areas or areas without special flood hazards. Some 30 to 50 percent of flood damage may occur in these areas. Additional issues requiring attention include mapping flood hazards, economic modeling in the analysis of alternatives, differences between communities and among building types, questions about different levels of reducing flood risk, and alternative approaches to mitigation.

Tyler, Kimberly A. (2000). The effects of an acute stressor on depressive symptoms among older adults. *Research on Aging*, 22(2), 143-65.
Keywords:
Midwest floods of 1993, health effects
Abstract: This study uses longitudinal data to examine the potential moderating effects of social support and age among older adults exposed to an acute stressor. Using a sample of 651 older persons, data were gathered in the spring of 1992 and in the fall of 1993, approximately 60 days after the peak impact of flooding in the Midwest. Results indicate a positive association between pre- and post-flood depression and a negative association between social support and post-flood depression. For the younger of the two older age groups, there is also a positive association between flood exposure and post-flood depression, controlling for prior levels of depression. Age interactions reveal that social support moderates the effects of flood exposure on depression only for the younger age group.

Ullmann, Owen. (2000). High-risk life, high expense to taxpayers, federal disaster aid makes it feasible to build in harm's way. *USA Today*, July 24.
Keywords:
Coastal Barrier Resources System, development, mitigation, coastal areas, repetitive losses
Abstract: Federal disaster programs inadvertently encourage people to build in high-risk coastal areas, and taxpayers pay most of the cost ($5 billion a year). FEMA has tried to block federal spending, but Congress has been reluctant to make reforms. Congress also rejected FEMA's request for more funds for a project that requires property owners to elevate properties to make them less flood-prone. One proposal would allow no more than two claims (repetitive claims account for 36 percent of all payments), and others would bar insurance for vacation homes and rental properties. Environmentalists want to ban people from building close to the shore, but the US Supreme Court ruled that states must compensate owners by paying the market value of their land if they ban development on private property. The Coastal Barrier Resources Act of 1982 was designed to discourage development on sections of barrier islands, but it spurred development in other coastal locations, creating expensive communities.

Ullmann, Owen, Paul Overberg, and Rick Hampson. (2000). Growth reshapes coasts: A wave of development overwhelms the shore. *USA Today*, July 21.
Keywords:
development, Massachusetts, South Carolina, coastal areas

Abstract: *USA Today* examined development in 1,000 counties along the Gulf and East Coasts and found these counties growing significantly faster than the rest of the country in population, employment, and gross domestic product. One in seven Americans lives along the East or Gulf Coasts, and beach economies are growing fast as jobs, businesses, and services follow this migration. Urban planners say that growth along these coasts will continue for 10 to 20 years and will be fed by demographic, economic, and social trends, such as the aging of the baby boomers with financial resources to fulfill their retirement dreams, telecommuting opportunities, improved transportation, and the quest for a better lifestyle. The article discusses the changing character of Cape Cod, MA, and Beaufort County, SC, with some attendant problems such as lack of affordable housing, water pollution, and strains on local government.

US Army Corps of Engineers. (1975). *Guidelines for Identifying Coastal High Hazard Zones*. Galveston, TX: US Army Corps of Engineers.
Keywords:
coastal areas, zoning, mapping, hurricanes
Abstract: The experience and analytical methods of USACE provided the impetus for these guidelines. The guidelines outline a suggested procedure for identifying areas along the Atlantic and Gulf Coasts subject to inundation by a hurricane surge and to significant wave action. Both of these conditions warrant specific building restrictions and special flood insurance rates. Most important, the guidelines identify the "3-foot breaking wave" as having the capability for damaging buildings. FEMA subsequently used this type of wave to distinguish V Zones from A Zones for the NFIP.

US Army Corps of Engineers. (1989). *Summary Report: Assessment of Floodplain Management Activities, Hattiesburg, Mississippi*. Mobile, AL: US Army Corps of Engineers.
Keywords:
Mississippi, floodplain management, compliance, modeling, development, property values
Abstract: This study assesses and analyzes the floodplain management activities that have occurred in Hattiesburg, MS. FEMA requested the study to determine the long-term impacts of a floodplain management program in a community. Using a computer model to quantify flood damages for 13 simulated conditions, the Army Corps of Engineers studied the city's three primary sources of flooding—the Leaf and Bowie Rivers and Gordons Creek—for the period from 1968 to 1989. Based on the analysis, the Corps of Engineers concluded that the floodplain in the city has grown over time in terms of both the number of structures and property values. For example, during the first 14 years of Hattiesburg's participation in the NFIP average annual damages increased by $299,500 due to development in the floodplain. However, in the absence of the city's participation in the NFIP and the completion of projects by the Army Corps of Engineers, flood damages would have increased by $1,519,800. The net effect of NFIP regulations when compared to no regulations (i.e., an unregulated floodplain), represents on average an annual savings of $605,000.

US Army Corps of Engineers. (1993). *Annual Flood Damage Report to Congress for Fiscal Year 1992*. Washington, DC: Government Printing Office.
Keywords:
Army Corps of Engineers, mitigation, structural approaches

Abstract: This report provides statistical information on storm events and flood damages nationwide, as well as flood damages prevented by projects controlled by the US Army Corps of Engineers. In fiscal year 1992, the Army Corps of Engineers' flood control projects and emergency activities prevented an estimated $8.1 billion in flood damages, or 91 percent of the potential flood damage to the nation. Total damages prevented between fiscal years 1982 and 1991 averaged $13.3 billion annually. The majority of flood damages suffered and flood damages prevented were concentrated in just a few states. The report contains detailed narrative accounts of storm events and other disasters nationwide in fiscal year 1992.

US Army Corps of Engineers. (1994). ***Procedures for Evaluating Wetlands Non-Market Values and Functions.*** **Washington, DC: US Army Corps of Engineers.**
Keywords:
property values, wetlands, Army Corps of Engineers
Abstract: This technical note provides a framework for evaluating the economic value of wetlands. More precisely, the note provides a guide for determining the effects of a proposed action on a wetland site. It emphasizes the importance of estimating the value of establishing the relationship and significance of the economic services of a wetlands site within a larger economic context. The note points out that the evaluation of flood control benefits requires estimating flood damages with and without the wetland's flood control capacity. These benefits can be determined by establishing the relationships between wetland flood storage capacity and flood damages downstream and the cost of providing alternative flood control structures or provisions for flood control.

US Army Corps of Engineers. (1995). ***Flood Proofing Regulations.*** **Washington, DC: US Army Corps of Engineers.**
Keywords:
building codes, floodproofing, Army Corps of Engineers
Abstract: This publication supercedes the two previously published editions (1972, 1992) that have been distributed worldwide as an administrative and technical model for code design and enforcement of floodproofing. This version of the report includes updates made in 1992, which reflect almost 20 years of field experience, research, and advances in engineering and building practices. The 1992 revision made numerous technical and editorial changes to requirements for floodplain management. The publication makes some clarifying changes to the 1992 edition, but retains the format of the 1972 edition. It specifies the floodproofing measures and techniques that can be followed to regulate private and public building construction in flood hazard areas. The publication also contains implications for changes in existing building and house codes and provides for a diversity of floodproofing methods and techniques.

US Army Corps of Engineers. (1995). ***Floodplain Management Assessment of the Upper Mississippi River and Lower Missouri River and Tributaries*****. Washington, DC: US Army Corps of Engineers.**
Keywords:
floodplain management, Midwest floods of 1993, Mississippi River, Missouri River
Abstract: This report compares impacts and costs of implementing a wide array of alternative policies, programs, and structural measures by assuming they had been in place at the time of the Midwest Floods of 1993. The analysis explores three scenarios of changes in flood insurance,

state and local floodplain regulation, flood hazard mitigation and disaster assistance, wetland restoration, and agricultural support policies. Data collected for the report, such as the economic damages from the 1993 flood, came from various sources. Feedback received during the coordination of this assessment presents contrasting views regarding the use of floodplains. However, the report does not resolve all of the issues or recommend an overall best plan. Rather, it serves as another tool in understanding the relative impacts of various potential actions.

US Army Corps of Engineers. (1996). *Risk-Based Analysis for Flood Damage Reduction Studies*. Hyattsville, MD: US Army Corps of Engineers.
Keywords:
cost-benefit analysis, mitigation, Army Corps of Engineers, risk communication
Abstract: Procedures described in this manual lead to the estimation of expected costs and benefits of proposed flood damage reduction measures, a description of the uncertainty in those estimates, and quantitative and qualitative representations of the likelihood and consequences of exceeding capacity of selected measures. The Army Corps of Engineers suggests that the careful communication of analysis results will better inform the public about what to expect from projects to reduce flood damage and thus ultimately lead to better decision making.

US Army Corps of Engineers, National Floodproofing Committee. (1984). *Floodproofing Systems & Techniques: Examples of Floodproofed Structures in the US*. Washington, DC: US Army Corps of Engineers.
Keywords:
Army Corps of Engineers, floodproofing, mitigation, nonstructural approaches
Abstract: The Flood Plain Management Services (FPMS) Program of the Army Corps of Engineers prepared this report. The FPMS Program uses its technical expertise in floodplain management to help parties outside the Corps of Engineers, both federal and nonfederal, deal with matters related to floods and floodplains. Most of the examples in the report come from a national survey developed and administered by USACE to document the various floodproofing techniques used around the nation. The Army Corps of Engineers collected additional information for the survey from local, state, and federal agencies involved in water resources planning. Results of the survey revealed innovative floodproofing efforts by people in their effort to reduce flood damages. The survey found many commonplace efforts, such as elevating structures and building levees and floodwalls. In addition, the survey noted several ingenious and complicated techniques, such as floatable houses and floodproofing stations controlled by computers. Most examples feature residential structures, but the report documents commercial structures as well. Of the structures tested by actual flooding conditions, USACE classifies approximately 50 percent as effectively floodproofed. Furthermore, the report provides conceptual ideas for formulating individual floodproofing plans.

US Army Corps of Engineers, National Floodproofing Committee. (1988). *Floodproofing Tests: Tests of Materials and Systems for Floodproofing Structures*. Washington, DC: US Army Corps of Engineers.
Keywords:
Army Corps of Engineers, floodproofing, mitigation, nonstructural approaches
Abstract: This report presents results from a series tests on floodproofing conducted by the Army Corps of Engineers. USACE analyzed closures, materials, and systems to determine their

effectiveness in protecting both residential and commercial properties from floodwaters. The experimental tests in the report deal with the treatment of brick-veneer and concrete-block walls—two commonly used building materials. Based on testing, the Army Corps of Engineers reached a number of conclusions including, but not limited to, the ability of two layers of brick to allow a brick-veneer wall to support greater water depths and the unreliability of epoxy, polyurethane, and asphalt coatings to keep water from penetrating a brick-veneer wall.

US Army Corps of Engineers, National Floodproofing Committee. (1990). *Raising and Moving a Slab-on-Grade House with Slab Attached*. Washington, DC: US Army Corps of Engineers.

Keywords:
floodproofing, mitigation, nonstructural approaches

Abstract: Many approaches to flood protection and flood loss reduction including the elevation or relocation of existing structures have not gained recognition as economically viable practices for structures on concrete slab foundations. In the case of slab foundations, two practical possibilities exist: detaching the structure from the floor slab or moving the entire structure with the slab attached. The latter method is not widely known and understood and is often believed to be infeasible. In practice, moving an entire structure with slab attached has proven both technically and economically feasible and has presented many advantages in the hands of an experienced structural mover. This report discusses the procedures for raising or relocating "slab-on-grade" structures with the slab attached, to identify some of the advantages and disadvantages, to suggest some factors to consider, and to indicate the possible costs involved. The procedures and techniques described here come primarily from those employed by a professional structural mover in Tampa, FL. Other professionals in the field can employ different but equally effective methods. No undertaking of this magnitude should be attempted without the advice and assistance of professional structural movers and structural engineers or architects.

US Army Corps of Engineers, National Floodproofing Committee. (1993). *A Floodproofing Success Story Along Dry Creek at Goodlettsville, Tennessee*. Washington, DC: US Army Corps of Engineers.

Keywords:
Tennessee, Army Corps of Engineers, floodproofing, mitigation, nonstructural approaches

Abstract: This report documents a successful floodproofing project in Goodlettsville, TN, where USACE elevated 19 homes. The report provides background on the project and gives a detailed description of the homes involved, the implementation procedure used, and the project costs incurred. The Nashville District of the Army Corps of Engineers used a nonstandard approach that reduced administrative costs by minimizing the involvement of the Corps and maximizing the involvement of homeowners. Homeowners had the opportunity to control many aspects of the work to ensure their satisfaction with the project. Appendix A discusses the economics of the floodproofing project. Appendix B presents samples of documents (information packages, agreements, covenants, etc.) used in the program. Finally, Appendix C summarizes the cost data and offers an equation that can be used to estimate costs during the early planning stages on similar projects.

US Army Corps of Engineers, National Floodproofing Committee. (1993). *Floodproofing: How to Evaluate Your Options*. Washington, DC: US Army Corps of Engineers.

Keywords:
floodproofing, mitigation, nonstructural approaches
Abstract: This document provides discussion to assist property owners, engineers, and contractors make a preliminary evaluation on the appropriateness of floodproofing and determine what floodproofing technique has the greatest effectiveness for the given conditions. Chapter 1 describes how floodproofing can reduce flood damage to buildings and their contents. Chapter 2 addresses factors to consider when contemplating floodproofing, such as local building codes, high costs associated with some types of floodproofing, and the inability to floodproof certain types of buildings. Chapter 3 provides brief descriptions of various floodproofing measures and refers the reader to sources providing more detail on techniques suitable for the structure under evaluation. Chapter 4 assesses the characteristics of flood situations. Chapter 5 summarizes the thought process behind evaluating physical, economic, and other factors involved in determining the viability of floodproofing for a structure that has experienced flood damage or has a significant potential for being flooded. Appendix A presents a detailed explanation of how to evaluate floodproofing options. Appendix B contains worksheet forms and graphs and Appendix C addresses hypothetical cases and illustrates factors that influence decisions about whether to floodproof.

US Army Corps of Engineers, National Floodproofing Committee. (1994). *Floodproofing Technology in the Tug Fork Valley*. Washington, DC: US Army Corps of Engineers.
Keywords:
Kentucky, West Virginia, floodproofing, mitigation, nonstructural approaches, structural approaches, Army Corps of Engineers
Abstract: For three days in April 1977, torrential rains and a subsequent flood caused monumental damage in the Tug Fork Valley of southern West Virginia and northeastern Kentucky. During a 50-year period, the Valley had experienced 37 damaging flood events. However, the April 1977 flood exceeded the 500-year event in many of the heavily populated areas of the Tug Fork Valley. In a few hours, the floodwaters destroyed 600 homes and heavily damaged another 5,000 structures. As the Valley's residents struggled to regain their foothold on life, the Huntington District of the Army Corps of Engineers began sowing the seeds of a plan to reduce flood damages. Aided by the passage of unique legislation, USACE waded into the flood-soaked Tug Fork Valley and developed a multifaceted plan destined to change the Valley's development pattern forever. This report presents the features of the plan and concentrates on the application of floodproofing technology in the Tug Fork Valley to reduce future flood damages. The report also discusses the lessons learned by the Army Corps of Engineers during its mission to achieve a cost effective and socially acceptable solution to flooding problems in the Valley.

US Army Corps of Engineers, National Floodproofing Committee. (1994). *Local Floodproofing Programs.* Washington, DC: US Army Corps of Engineers.
Keywords:
floodproofing, mitigation, nonstructural approaches
Abstract: Floodproofing involves altering an existing building or its immediate area to prevent or minimize damage during a flood. Alterations can range from minor changes to the utilities, to waterproofing walls, to elevating the building above flood levels. Floodproofing has significant potential to reduce flood losses. Many people have floodproofed their homes or businesses, often by using common sense or self-taught approaches. During the last decade, federal, state, and

local agencies have researched techniques, promoted floodproofing as a viable flood protection measure, and assisted property owners in implementing projects. This report provides advice for local communities interested in financing floodproofing projects. It does not represent a formula for developing a model program, because each community must design its own approach based on local flood hazards, building conditions, financial needs and resources. The report provides examples and photographs of projects financed by local governments. Appendix A summarizes local programs that have funded multiple floodproofing projects and mentions contact information for communities that have investigated and/or designed financing programs for floodproofing.

US Army Corps of Engineers, National Floodproofing Committee. (1996). *Floodproofing: Techniques, Programs, and References*. Washington, DC: US Army Corps of Engineers.
Keywords:
floodproofing, mitigation, federal programs, nonstructural approaches
Abstract: This report addresses various approaches to floodproofing and the programs, references, and terminology of federal efforts in floodproofing. It presents a general overview of floodproofing techniques and provides the reader with information on government agencies that offer assistance and on publications that detail relevant information. The first chapter introduces the reader to floodproofing by explaining its basic concept, general approaches, and specific techniques. Chapter 2 describes floodproofing activities undertaken by the federal government, and Chapter 3 discusses specific floodproofing programs of government agencies. Chapter 4 presents reference publications on floodproofing, and Chapter 5 explains how to locate additional publications on floodproofing from the Floodplain Management Resource Center at the Natural Hazards Center in Boulder, CO. The final chapter provides a glossary of terms related to floodproofing, flood insurance, and floodplain management.

US Army Corps of Engineers, National Flood Proofing Committee. (1998). *Flood Proofing Performance: Successes & Failures.* Washington, DC: US Army Corps of Engineers.
Keywords:
Army Corps of Engineers, nonstructural approaches, mitigation, building codes, floodproofing
Abstract: This report examines how structural floodproofing measures have performed when tested by actual floods. Researchers collected data from 12 flood events throughout the United States between 1986 and 1997 and then reviewed the damage and building performance data on each structure. The report identifies specific floodproofing measures and whether they failed or succeeded. In most cases the lessons from failed measures have more educational value than the lessons from successful ones. Chapter 4 of the report summarizes several lessons learned in floodproofing structures such as minimizing the amount of obstruction beneath an elevated structure in hurricane and high-velocity riverine areas and purchasing flood insurance for floodproofed structures and contents.

US Army Corps of Engineers, National Floodproofing Committee. (2001). *Nonstructural Flood Damage Reduction Projects: What Districts Are Doing*. Washington, DC: US Army Corps of Engineers.
Keywords:
Army Corps of Engineers, floodproofing, nonstructural approaches, mitigation

Abstract: Nonstructural techniques for the reduction of flood damages consist of measures such as relocation, acquisition, floodproofing, flood insurance, flood preparedness/warning/response, and public education. Nonstructural techniques have proven to be extremely viable in alternatives consisting of total nonstructural or a combination of structural and nonstructural. The National Floodproofing Committee (NFPC) of the Army Corps of Engineers has recognized that sharing the successes of nonstructural techniques within the Army Corps of Engineers may help those districts considering these alternatives. The NFPC has compiled into this document applicable portions of reports developed by various districts that show the formulation, justification, and implementation of nonstructural projects. The formulation and justification of some projects comply with criteria established by USACE. Other projects documented do not but respond to a specific request from Congress. Examples of both kinds show the wide range of procedures and authorities used by districts to ensure the success of nonstructural projects.

US Congress. (1992). ***A Descriptive Analysis of Federal Relief, Insurance, and Loss Reduction Programs for Natural Hazards.*** **Report to the Subcommittee on Policy Research and Insurance of the Committee on Banking, Finance, and Urban Affairs. Washington, DC: Government Printing Office.**

Keywords:
federal programs, disaster assistance, cost-benefit analysis

Abstract: This report summarizes current federal disaster relief policies, existing and proposed insurance and loss control programs, and briefly discusses their evolution. A major theme in the report is whether the federal programs for dealing with natural disasters are operating in cost-effective manners. Disaster relief policies present relatively straightforward issues for debate, including eligibility for assistance and the parameters of that assistance. Proposed insurance options, by comparison, require the consideration of additional issues, for example, the achievement of actuarial soundness. Actuarial soundness is one measure of the insurance program's cost-effectiveness. Insurance programs must also consider the issue of participation and whether the availability of disaster relief may serve as a disincentive to some to participate in insurance programs.

US Department of Housing and Urban Development (HUD). (1977). ***National Conference on Coastal Erosion*****. Proceedings of the National Conference on Coastal Erosion, July 6-8, 1977, Cape May, New Jersey. Washington, DC: HUD and FIA.**

Keywords:
erosion, coastal areas

Abstract: Participants of the National Conference on Coastal Erosion came from federal agencies, state government, local communities, and private institutions to provide insight into the problems of studying, mapping, regulating, and insuring areas with erosion hazards. The main body of this document consists of the transcript of the conference's final day. Comments submitted to FIA following the conference varied greatly in length and specificity yet identified three common themes: (1) NFIP legislation should be changed to eliminate the need to distinguish between anticipated and unanticipated erosion; (2) regulations concerning land use should be emphasized in any program addressing erosion hazards; and (3) methods of analyzing recession rates should be evaluated further and any overall standards should accommodate state or regional differences. Correspondence from participants, a list of participants, and a

bibliography of documents submitted in conjunction with the conference also appear in the document.

US Department of Housing and Urban Development (HUD) and FEMA. (1981). *Evaluation of the Economic, Social and Environmental Effects of Floodplain Regulations.* Washington, DC: HUD and FEMA.

Keywords:
development, floodplain management, hundred-year flood standard

Abstract: This study quantifies the economic, social, and environmental effects of regulating the 100-year floodplain. Twenty-three communities were selected for analysis according to location, flood hazard type, community size, and economic condition. Effects of floodplain regulations were evaluated by projecting development for 1980 and 1990 under three regulatory scenarios: (a) no regulations, allowing the free market to determine the 100-year floodplain use; (b) moderate regulations similar to those in effect at the time the report was published; and (c) stringent regulations forbidding new development and substantial improvements to existing structures and "correcting" past land-use decisions that interfere with natural functions of the 100-year floodplain. The study concludes that, without regulations, average annual flood losses would increase sharply (29 percent by 1980; 71 percent by 1990). Under moderate regulations, losses in Scenario I would decrease by 87 percent in 1980, and by 85 percent in 1990. Regulations that prevent development produce a small, but measurable absolute decline in average annual flood losses (1 percent by 1990). Also, without regulations, the total number of housing units in the 100-year floodplain would increase 13 percent by 1980 and 35 percent by 1990; population would increase in the 100-year floodplain 12 percent by 1980 and 29 percent by 1990. With moderate regulations, this increase in housing would decrease by 37 percent in 1980 and by 78 percent by 1990; the increase in population would decrease by 43 percent in 1980 and 41 percent in 1990. With stringent regulations, housing units in the 100-year floodplain would decline 1 percent by 1980 and 6 percent by 1990. Finally, without regulations there would be a continuing, unlimited conversion of open floodplain to urban uses, an additional 37 percent rise by 1990. Moderate regulations would reduce this increase to 1 percent by 1990. Stringent regulations would not allow any further development of the floodplain, would begin to remove existing development, and would result in a 2-percent reduction of developed acres.

US Department of the Interior. (1994). *The Impact of Federal Programs on Wetlands – Vol. II*. Washington, DC: US Department of the Interior.

Keywords:
federal programs, wetlands, floodplain management, agriculture, development, urban areas, Coastal Barrier Resources System, economic impacts, Florida, Louisiana, Texas, Puerto Rico, California, Alaska, Delaware, Maryland, Virginia, North Carolina, New Jersey, Michigan, Nebraska

Abstract: Wetlands are a vital element in the biosphere and produce numerous benefits for society. They provide critical nursery habitat for many species of fish and wildlife. By temporarily storing large quantities of water, wetlands play an important role in reducing flooding problems and recharging ground water. This is the second of two reports to Congress on how federal programs impact wetlands. Volume I, submitted to Congress in 1988, examined how federal programs have affected wetlands in the bottomland hardwoods of the Lower Mississippi Alluvial Plain and the prairie potholes of the Upper Midwest. Volume II focuses on 17 additional

study areas, selected because they reflect the broad array of problems facing wetlands nationwide: Florida's Everglades, coastal Louisiana, Texas's Galveston Bay, the Puerto Rican mangroves and coastal wetlands, California's Central Valley, western riparian wetlands, southeastern and western Alaska, the Delmarva Peninsula (comprising parts of Delaware, Maryland, and Virginia), North Carolina's pocosins and other freshwater wetlands, northeastern New Jersey, Michigan's coastal and northern forested wetlands, and Nebraska's Rainwater Basin. Volume II contains five parts. The four chapters in Part I describe the federal programs affecting wetlands: agriculture; water development and management; infrastructure, local development, and housing; and resource use, extraction, and development. Parts II through V are organized regionally and examine the 17 study areas.

US Fish and Wildlife Service. (2002). ***The Coastal Barrier Resources Act: Harnessing the Power of Market Forces to Conserve America's Coasts and Save Taxpayers' Money*****. Washington, DC: US Fish and Wildlife Service.**
Keywords:
Coastal Barrier Resources Act, coastal barriers, environmental policy, public policy, economic impacts, development, disaster assistance, federal programs
Abstract: According to the US Fish and Wildlife Service, the Coastal Barrier Resources Act has saved taxpayers approximately $1.3 billion since its passage in 1982. This report investigates four areas of federal savings: roads, wastewater systems, potable water supply, and disaster assistance from the Stafford Act. For example in disaster assistance alone, which includes both disaster relief and development assistance from the Stafford Act, the report estimates a combined savings of about $1.279 billion from 1983 through 2010. While evidence indicates the Act has saved taxpayers' money, uncertainty still exists as to whether the Act has met other fundamental objectives including the reduction of development in risky and biologically rich coastal barriers. Some units in the CBRS have developed significantly despite the Act's restrictions. Future studies should investigate the nature of and extent of development that has occurred in coastal barriers within and outside the System. Furthermore, the report recommends implementation of appropriate state and local policies to bolster the Act's impact.

US General Accounting Office (GAO). (1975). ***National Attempts to Reduce Losses from Floods by Planning for and Controlling the Uses of Flood-Prone Lands*****. Report to the Congress. Washington, DC: GAO.**
Keywords:
Unified National Program
Abstract: This review was conducted to inform Congress about the effectiveness of a unified national program for reducing losses due to floods, as proposed by a task force established by the President in 1966. GAO found that little progress has been made toward curtailing disastrous flood losses by planning for and controlling the uses of flood-prone lands. Development of such lands has continued, making the program's objective more difficult to achieve. The main reasons cited for the lack of progress are: (a) the lack of adequate evaluation of federal agencies, (b) the lack of adequate technical assistance from federal agencies on planning and regulating the use of flood-prone lands, (c) the need for better monitoring and leadership for federal flood control efforts, and (d) the need for more cooperation between federal, state and local governments to minimize flood losses.

US General Accounting Office (GAO). (1975). *Tulsa, Oklahoma's Participation in the National Flood Insurance Program*. Report to the Honorable James R. Jones, House of Representatives. Washington, DC: GAO.

Keywords:
compliance, Oklahoma, mandatory purchase, development, enforcement, legislation

Abstract: GAO evaluated the nature and extent of development in Tulsa's Mingo Creek floodplain between February 15, 1972 (when the city adopted floodplain management regulations) and December 15, 1974. This report examines the effectiveness of federal, state, and local monitoring procedures designed to prevent improper development. GAO identified all loans for acquisition or construction of property in the Mingo Creek floodplain to determine whether mandatory flood insurance was required and had been obtained. GAO also examined NFIP policies, procedures, and legislative history. The final aspect of the study included interviews with federal, state, and local officials responsible for implementing the program as well as officials at financial institutions and the National Flood Insurers Association Serving Office. GAO recommends five changes to increase the NFIP's effectiveness: (a) approve legislation that would prohibit federally regulated financial institutions from purchasing mortgages in the secondary market on properties that are required to but do not have flood insurance; (b) require communities to demonstrate adequate procedures for enforcing floodplain management regulations as part of admission into the NFIP; (c) establish a monitoring system to ensure that communities comply with adopted regulations; (d) clarify FIA regulations on communities proposing changes to floodplain levels; and (e) require future development in floodplains to be 1 foot above the 100-year flood level. This report includes FIA's response to each of the recommendations and actions to be taken.

US General Accounting Office (GAO). (1976). *Formidable Administrative Problems Challenge Achieving National Flood Insurance Program Objectives*. Report to the Congress. Washington, DC: GAO.

Keywords:
compliance, mandatory purchase, mapping, legislation, NFIP

Abstract: This report examines efforts of the Department of Housing and Urban Development (HUD) to implement the Flood Disaster Protection Act of 1973. The GAO's extensive analysis of the NFIP for this report included: a review of pertinent policies, procedures, studies, and legislative history; interviews with federal, state, and local officials and FIA contractors responsible for implementing the NFIP; and visits to nine communities in five states to review local efforts to implement program requirements. GAO found that: (a) flood insurance studies and rate maps were not being produced at a rate to meet the August 1, 1983, deadline for having all flood-prone communities participating in the regular phase of the NFIP; (b) FIA needs to better monitor community efforts to adopt and enforce floodplain management regulations; (c) flood insurance was generally being obtained when any federal financial assistance was required (about 90 percent of mortgage transactions tested); (d) federal policy on secondary market purchases is often inconsistent and needs to be clarified. The report includes responses from HUD, FIA, and other federal agencies impacted by the recommendations in the report.

US General Accounting Office (GAO). (1979). *How do Federal Agencies Assure that Disaster Loan Recipients Maintain Mandatory Flood Insurance?* Report to the Chairman,

Subcommittee on Oversight and Review, Committee on Public Works and Transportation, House of Representatives. Washington, DC: GAO.
Keywords:
Farmers Home Administration (FmHA), Small Business Administration, disaster assistance, mandatory purchase, enforcement
Abstract: GAO reviewed the disaster loan programs of the Farmers Home Administration (FmHA) and the Small Business Administration (SBA) to examine the procedures used by federal agencies to ensure that disaster loan recipients maintain flood insurance when required as a condition for such loans. GAO reviewed legislation, agency policies, procedures, regulations, and guidelines in addition to gathering statistics on repeat flooding, flood insurance policies, and FmHA and SBA flood disaster loan activities since FY 1975. Neither of these agencies nor FEMA had adequate information concerning the number of communities suffering repeat flooding, the number of loans requiring mandatory flood insurance made in SFHAs, and the number of borrowers required to buy flood insurance who had failed to renew or had their insurance cancelled before the final repayments of their loan. Therefore, GAO could not determine the extent of actual or potential losses to the government and to borrowers from failure to maintain flood insurance. Since neither of the legislative acts covering flood and disaster relief specifically addresses second loans to individuals failing to maintain required insurance on previous loans, FEMA, FmHA, and SBA have established their own policies and regulations on subsequent assistance. Some inconsistency in the practices of the three agencies exists. FEMA has certain corrective actions planned to combat the current lack of adequate information at the community and borrower levels. FmHA had adequate procedures to protect the government's interest by ensuring that flood insurance is maintained where required. SBA practices appear to be less than adequate in that the agency does not have contingency procedures that allow it to pay the insurance premium if the borrower fails to renew.

US General Accounting Office (GAO). (1979). ***Improvements Are Still Needed in the Administration of the Flood Insurance Program*****. Report to the Honorable Patricia Roberts Harris, Secretary of Housing and Urban Development. Washington, DC: GAO.**
Keywords:
compliance, mapping, NFIP, hundred-year flood standard, floodplain management
Abstract: This report was conducted to identify problems affecting program administration and the attainment of legislative objectives. GAO interviewed FIA staff at headquarters and three regional offices, met with state and local floodplain officials, and obtained information from federal agencies and several private sector experts. The report makes several key findings: the mapping program continues to have problems, floodplain management needs more emphasis, communities require more assistance to implement the program, the 100-year standard needs evaluation, and the monitoring program requires improvements. Furthermore, some FIA policies, such as permitting the replacement of structures in the floodway, appear to be contrary to the objective of minimizing future flood damages. GAO recommends possible programmatic changes in response to each of the problems identified. For example, FIA should establish a cost-sharing arrangement with localities for (re)mapping work. In almost all cases FIA agreed to investigate the feasibility of implementing the report’s recommendations.

US General Accounting Office (GAO). (1980). *Federal Disaster Assistance: What Should the Policy Be?* Report to the Chairman and Ranking Minority Member, Committee on the Budget, US Senate. Washington, DC: GAO.
Keywords:
disaster assistance, federal programs, agriculture
Abstract: This report examines the federal government's financial role in disaster assistance to determine what the role and the relevant guiding principles should be. It discusses the five major disaster assistance programs, which include: the Small Business Administration's disaster loan program, the Farmer Home Administration's emergency loan program, the Disaster Payments Program (Department of Agriculture), the Federal Crop Insurance Program (administered by the Federal Crop Insurance Corporation), and the NFIP. These five program provide three generic forms of subsidized assistance: loans, grants, and insurance. GAO believes the following general criteria should be recognized in designing disaster assistance programs: (a) incentives should be minimized for poor locational decisions; (b) likes should be treated alike within programs, across programs, and over time; and (c) no individual or group should be able to improve on their predisaster condition unless it would reduce future government cost.

US General Accounting Office (GAO). (1981). *Requests for Federal Disaster Assistance Need Better Evaluation*. Report to the Congress. Washington, DC: GAO.
Keywords:
disaster assistance, federal programs, public assistance
Abstract: Since 1970, the President's Disaster Relief Fund has provided $3.8 billion to individuals and state and local governments. FEMA, in assessing the eligibility for disaster assistance, has had difficulty in determining whether state and local governments are capable of handling their own disasters and whether they are committing a reasonable amount of their available funds for disaster relief. GAO also found that FEMA has adopted a controversial cost-sharing policy and has funded disasters other than natural ones. GAO recommends that Congress clarify the extent of supplemental federal assistance to be given and the kinds of disasters that are eligible for federal assistance. FEMA should analyze the impact potential state inequities have on federal disaster assistance and submit a detailed plan and legislative changes to Congress to correct such weaknesses.

US General Accounting Office (GAO). (1982). *National Flood Insurance: Marginal Impact on Floodplain Development, Administrative Improvements Needed*. Report to the Subcommittee on Consumer Affairs, Committee on Banking, Housing, and Urban Affairs, US Senate. Washington, DC: GAO.
Keywords:
coastal areas, development, coastal barriers
Abstract: This report compares the rate of community development and availability of flood insurance in six communities. GAO looked at ten years of data on the number of new housing units authorized for each community and interviewed 115 people. None of the interviewees said they viewed flood insurance as the principal factor in development but almost all said it aided development since it was a "sweetener" in lessening investment risks. Many of those interviewed said that the availability of flood insurance had affected their community by increasing financial security and by forcing higher construction standards. Both factors were viewed as "enhancing" development. Nothing in the program effectively discourages new development. With increasing

growth in coastal areas, GAO felt the risk of loss was inevitably growing and concluded that there is no assurance that the structures would safely survive a major storm, so it may be bad public policy to continue to provide coverage in coastal areas. The report also notes that a multitude of factors influences a builder to construct, an individual to occupy a structure, or a businessman to locate in a coastal or barrier island community. These factors include demand for location on highly desirable beach property, viability of local economies, and availability of community infrastructure. The report observes that the NFIP offers a "marginal added incentive" to development.

US General Accounting Office (GAO). (1983). ***Alternative Approaches for Converting National Flood Insurance Program Communities from the Emergency Phase to the Regular Phase*****. Testimony before the Subcommittee on Insurance, Committee on Banking, Housing, and Urban Affairs, US Senate. Washington, DC: GAO.**
Keywords:
mapping, agency operations and management
Abstract: GAO reports that FEMA will not meet the August 1983 deadline contained in the National Flood Insurance Act of 1968 for mapping flood hazards for all flood-prone communities. The primary reasons for such a failure include the unexpected magnitude of the undertaking and the nonuse of less costly and time-consuming alternative techniques for producing rate maps. GAO concluded that Congress should consider and select an optimal approach to complete the mapping project.

US General Accounting Office (GAO). (1983). ***Effect of Premium Increases on Achieving the National Flood Insurance Program's Objectives*****. Report to the Subcommittee on Department of Housing and Urban Development-Independent Agencies, Committee on Appropriations, House of Representatives. Washington, DC: GAO.**
Keywords:
insurance premiums, insurance purchase decision
Abstract: In response to a congressional request, GAO reviewed the impact that recent rate increases had on individual and community participation in the NFIP. GAO found that in the first two years after FEMA raised rates in January 1981, individual participation declined. Participation fell from a peak of about 2,014,500 policies in December 1980 to about 1,860,400 in November 1982. GAO identified several factors in addition to the rate increases that could have contributed to the decline in individual participation. These factors include: (a) the decline in the housing market during the last few years; (b) the smaller number of floods and flood losses experienced in the last few years; and (c) the general economic recession. During this period, six small communities left the program. GAO found that none of the six communities left the program because of the rate increases. Rather, their reasons for leaving the program included the building restrictions imposed by the floodplain management criteria, a belief that there was not a need for flood insurance, and communities' dislike of having the federal government tell them what they could and could not do in their flood-prone areas.

US General Accounting Office (GAO). (1983). ***National Flood Insurance: Major Changes Needed if It is to Operate without a Federal Subsidy*****. Report to the Subcommittee on Consumer Affairs, Committee on Banking, Housing, and Urban Affairs, US Senate. Washington, DC: GAO.**

Keywords:
insurance premiums, subsidies, economic modeling
Abstract: GAO reports that the NFIP has not collected sufficient premiums to cover the cost of providing the insurance of about 1.9 million policyholders living in flood-prone areas. To compensate for the inadequate premium income, FIA borrowed $854 million from the US Treasury between 1970 and 1980. This report says that FEMA has relied on a combination of models and judgment to set the insurance rates, but methodological and data weaknesses in this approach have produced an overly complex rate structure that has not generated sufficient income to cover the costs of providing insurance or build up a reserve. The report notes FEMA's intention to eliminate the federal subsidy by 1988. GAO recommends that Congress consider telling FEMA whether it agrees with the agency's shift toward rate increases or coverage reductions. GAO also recommends that FEMA establish a monitoring program to detect any adverse impact that increases in chargeable rates or decreases in coverage may have on the program's objectives.

US General Accounting Office (GAO). (1986). ***Flood Insurance: Federal Emergency Management Agency's Basement Coverage Liability*****. Fact Sheet for Congressional Requesters. Washington, DC: GAO**.
Keywords:
basements, insurance coverage
Abstract: Effective October 1983, FIA limited insurance coverage for basements to reduce the NFIP's payment of future claims. The limitation was initiated because FIA believed that flooding of basements represents a risk inconsistent with a sound insurance program and that the program should respond only to the basic needs of its policyholders. This fact sheet was written in response to congressional requests about: (a) FIA's authority to make such a policy change; (b) the procedure used to justify the policy; (c) the legality of the notification process; and (d) why other alternatives were rejected. GAO found that FEMA had authority to decide what should be insured, the nature and limits of loss or damage, the classification of risks by type, and risk limitations and rejections. After reviewing the analysis used to make the decision about limiting basement coverage, GAO found that two of the three reports used did not mention basement flooding and while the examination of claims data may not have overstated losses due to basement coverage, FIA should have used more complete methods, including a survey of closed claims. GAO then examined the notification of policyholders about the new limitations placed on basement coverage, finding that federal courts had ruled the procedure was legally adequate. The fact sheet also presents information about why FIA did not select one of five other alternatives for modifying basement coverage.

US General Accounting Office (GAO). (1987). ***Flood Insurance: Private Companies' Participation in the Write Your Own Program*****. Report to the Subcommittee on Legislation and National Security, Committee on Government Operations, House of Representatives. Washington, DC: GAO.**
Keywords:
Write Your Own Program, insurance industry
Abstract: In response to a congressional request, GAO reviewed the status of the Write Your Own (WYO) Program. GAO conducted interviews with officials at FIA, FEMA's Office of Inspector General, Computer Sciences Corporation (the contractor that manages WYO

companies), and WYO companies as well as a reviewed legislative history and program files. GAO determined that: (a) as of September 1986, there were over 1 million WYO policies, about half of all NFIP policies; (b) the relationship between allowances retained from policy premiums for administrative costs and benefits to the federal government is uncertain (FIA does not require WYO companies to keep records of their actual costs to implement the program, but most indicated that they incurred administrative expenses for various activities, including marketing.); and (c) FIA is still in the process of implementing statistical reporting requirements, on-site reviews, and audits to ensure that WYO companies sell and service policies in accordance with program requirements. GAO found that FIA's monitoring indicates that most companies have satisfactorily implemented the program. WYO companies expressed concern about the WYO program. For example, WYO companies did not want to compete with FIA's direct sales program. The companies also felt that FIA did not provide enough advance notice on insurance premium changes and that FIA would need to increase insurance rates in order to meet the program's long-range goal of having them share claims costs.

US General Accounting Office (GAO). (1988). *Flood Insurance: Statistics on the National Flood Insurance Program*. Fact Sheet for Congressional Requesters. Washington, DC: GAO.

Keywords:
coastal areas, liability, repetitive losses, mitigation, insurance premiums, agency operations and management

Abstract: GAO compiled this fact sheet in response to a request for more information about the federal government's role in protecting coastal resources and the exposure of the government to undesired levels of liability. GAO produced the statistics based on numbers provided by FEMA; the numbers were not independently verified. The statistics presented fall into six categories: (a) NFIP's annual operating income/deficit, (b) number of policies in coastal areas and Great Lakes' states, (c) total and repetitive losses, (d) flood-damaged property purchases by FEMA, (e) damages in excess of the maximum flood insurance available, and (f) annual average premiums and losses on policies for properties in coastal high-hazard areas. In 1987 the NFIP had about 2.1 million policies in-force, worth about $162 billion. In the period from 1978 to 1987 the NFIP had a cumulative net operating deficit of about $652 million, with losses totaling about $2.4 billion.

US General Accounting Office (GAO). (1990). *Flood Insurance: Information on the Mandatory Purchase Requirement.* Fact Sheet for Congressional Requesters. Washington, DC: GAO.

Keywords:
Texas, Maine, mandatory purchase, lending institutions, enforcement

Abstract: This fact sheet addresses the views of FIA, regulatory agencies, and lenders on issues related to compliance with the mandatory purchase provision of the Flood Disaster Protection Act of 1973, the level of compliance in certain areas of Texas and Maine, and efforts to increase compliance. FIA and regulatory agencies disagree about the level of compliance with the mandatory purchase requirement. FIA believes the noncompliance rate may be substantial while regulatory agencies such as the Federal Deposit Insurance Corporation and Federal Reserve System report noncompliance as a relatively minor problem, chiefly involving technical matters. To measure the level of compliance in certain areas of Texas and Maine, GAO obtained information on all personal residences in SFHAs for which disaster assistance was requested.

The analysis estimates that in Texas and Maine about 79 percent and 22 percent, respectively, of these residences did not have the required flood insurance. One reason cited by lenders, among others, for not requiring flood insurance involved policies lapsing on properties requiring flood insurance at loan origination. Finally, GAO provides information on efforts to increase compliance including regulatory agencies following up with lenders reviewed in Texas and Maine that did not require flood insurance. The fact sheet also outlines actions FIA and lending institutions take to decrease rates of noncompliance.

US General Accounting Office (GAO). (1991). ***Federal, State, and Local Responses to Natural Disasters Need Improvement.*** **Report to Congressional Requesters. Washington, DC: GAO.**

Keywords:

Hurricane Hugo, disaster planning

Abstract: This report examines how FEMA and other federal agencies responded to California's Loma Prieta earthquake and to Hurricane Hugo, which struck the US Virgin Islands, Puerto Rico, and the Carolinas. The report contends that preparedness is the most critical aspect of emergency management because it affects states' ability to respond to disaster. Problems with preparedness were linked to weaknesses in state and local programs, as well as in FEMA's assistance and overall guidance. These problems included inadequate planning and training for recovery, low participation by elected officials in training exercises, inadequate or no standard operating procedures for response and recovery activities, failure to correct problems identified during earlier training exercises, a limited number of staff having the necessary disaster assistance skills, and inadequate coordination between several federal agencies.

US General Accounting Office (GAO). (1991). ***Wetlands Overview: Federal and State Policies, Legislation, and Programs.*** **Fact Sheet to Congressional Requesters. Washington, DC: GAO.**

Keywords:

wetlands, federal programs,, legislation, environmental policy

Abstract: In recent years, the benefits of wetlands—such as providing habitat for fish and wildlife and abating erosion—have become better known. Unfortunately, an estimated 50 percent of all wetlands in the lower 48 states have already been filled or drained, and another 290,000 acres are being lost annually to agriculture and development. This fact sheet provides an overview of federal and state wetlands-related policies, legislation, and programs.

US General Accounting Office (GAO). (1992). ***Coastal Barriers: Development Occurring Despite Prohibitions against Federal Assistance*****. Report to the Committee on Environment and Public Works, US Senate. Washington, DC: GAO.**

Keywords:

Coastal Barrier Resources Act, Coastal Barrier Resources System, development, legislation, insurance coverage

Abstract: GAO states that while the Coastal Barrier Resources Act (CBRA) of 1982 and its successor, the Coastal Barrier Improvement Act of 1990 had effectively discouraged development in some areas, other areas had undergone significant new development and more was planned. The report notes that one part of the problem was lax compliance, noting that the NFIP did not have controls in place to assure that private insurers under the Write Your Own

(WYO) Program were complying. Based on sampling in five units, GAO projected that the NFIP had written coverage for 9 percent of the homeowners in units of CBRS.

US General Accounting Office (GAO). (1993). ***Disaster Management: Improving the Nation's Response to Catastrophic Disasters.*** **Report to Congressional Requesters. Washington, DC: GAO.**
Keywords:
Hurricane Andrew, Hurricane Iniki, Hurricane Hugo, Florida, Hawaii, federal programs, disaster assistance, disaster planning
Abstract: The nation's management of disasters was strongly criticized after Hurricane Andrew leveled much of South Florida and Hurricane Iniki devastated Kauai in 1992. Even before these storms, the federal government's response to major disasters like Hurricane Hugo and the Loma Prieta earthquake drew intense criticism. The government's response to Hurricane Andrew, in particular, raised doubts about whether FEMA was capable of responding to such catastrophes and whether it had learned any lessons from Hurricane Hugo and the Loma Prieta earthquake. GAO has testified repeatedly in 1993 on the inadequacy of the federal strategy for responding to disasters. This report summarizes GAO's analyses, conclusions, and recommendations.

US General Accounting Office (GAO). (1994). ***Federal Disaster Assistance: Goals are Good, But Insurance Programs Would Expose the Federal Government to Large Potential Losses.*** **Testimony before the Committee on Commerce, Science, and Transportation, US Senate. Washington, DC: GAO.**
Keywords:
liability, legislation, federal programs, disaster assistance, insurance industry, insurance, mitigation
Abstract: Although the insurance industry has absorbed losses from recent natural disasters without systemic failures, concerns exist about its ability to handle losses from potentially larger disasters. The federal government has absorbed a large portion of the losses from past disasters and is likely to pay out even larger amounts in the future. Proposed legislation in the Senate (S. 1350) would establish three interrelated programs: a multihazard disaster mitigation program, a primary insurance program for earthquakes and volcanic eruptions, and a reinsurance program to cap insurers' losses when major disasters occur. This testimony explains in detail the provisions of S. 1350 and provides GAO's analysis and concerns about the legislation. For example, GAO has great concern about the way the proposed federal reinsurance fund and the insurance industry would share losses. The basis for determining when the fund becomes liable for payment of disaster losses could be subject to insurer manipulation that could result in substantial increases to the fund's liability.

US General Accounting Office (GAO). (1994). ***Flood Insurance: Financial Resources May Not Be Sufficient to Meet Future Expected Losses.*** **Report to Congressional Requesters. Washington, DC: GAO.**
Keywords:
subsidies, insurance premiums, liability, agency operations and management
Abstract: This report addresses the actuarial soundness of the NFIP. GAO found that the program is intentionally not actuarially sound because Congress authorized subsidized insurance rates to be made available for policies covering certain structures, and, as of 1993, about 41

percent of policies were subsidized. With respect to the potential financial impacts of increasing subsidized flood insurance rates and enhancing program participation, both were determined to be potentially harmful. Increasing premiums would encourage policyholders to cancel their insurance and seek assistance through other federal disaster relief programs. However, encouraging participation in the flood insurance program would increase the amount of subsidized insurance rates, thereby worsening the NFIP's financial condition. Finally, the GAO describes the procedures used to set the program's insurance rates.

US General Accounting Office (GAO). (1995). ***Disaster Assistance: Information on Expenditures and Proposals to Improve Effectiveness and Reduce Future Costs.*** **Testimony before the Subcommittee on VA, HUD, and Independent Agencies, Committee on Appropriations, US Senate. Washington, DC: GAO.**
Keywords:
disaster assistance, agency operations and management
Abstract: This report discusses ways to enhance the effectiveness of a number of federal disaster assistance programs, identifies proposals to lower future federal costs, and addresses the accuracy of financial information in FEMA's Disaster Relief Fund. Three main conclusions emerge. First, there are ways to improve federal disaster assistance programs, including greater flexibility on FEMA's part in providing grant funding, enabling military reserve components to provide disaster assistance, and clarifying the conditions under which FEMA would pay more than the replacement cost to restore certain structures. Second, proposals have been made to modify and lower the costs of federal disaster assistance, including more explicit and/or stringent criteria for disaster assistance, emphasizing hazard mitigation through incentives, and relying more on insurance. Third, problems exist with FEMA's current accounting systems, such as field office systems that are neither integrated nor linked to FEMA's central accounting system.

US General Accounting Office (GAO). (1995). ***Midwest Flood: Information on the Performance, Effects, and Control of Levees.*** **Report to Congressional Requesters. Washington, DC: GAO.**
Keywords:
Midwest floods of 1993, Army Corps of Engineers, levees
Abstract: In response to the Midwest floods of 1993 in nine states, Congress asked GAO to examine the operation of levees. This report addresses the extent to which: (a) the Army Corps of Engineers' flood control levees prevented flooding and reduced damage during the event; (b) the federal levees increased the height of the flooding and added to the damage; and (c) federal, state, and local governments exercise control over the design, construction, placement, and maintenance of nonfederal levees. GAO found that most Army Corps of Engineers' levees prevented flooding and reduced damage; levees increased flood levels but represented one of many factors affecting the extent of flooding; and federal, state, and local governments exercise some control over nonfederal levees.

US General Accounting Office (GAO). (1996). ***Disaster Assistance: Improvements Needed in Determining Eligibility for Public Assistance.*** **Testimony before the Subcommittee on VA, HUD, and Independent Agencies, Committee on Appropriations, US Senate. Washington, DC: GAO.**
Keywords:

cost-benefit analysis, disaster assistance, public assistance
Abstract: This report reviews FEMA's public assistance program, which funds the repair of eligible public facilities – such as roads, government buildings and utilities – that are damaged in natural disasters. This report evaluates FEMA's criteria for determining eligibility for public assistance, FEMA's monitoring of public assistance expenditures, and potential changes in eligibility that could lower the costs of public assistance. FEMA's criteria for determining eligibility of certain nonprofit facilities were deemed ambiguous and regional officials were not systematically updated of policy changes. States are largely responsible for ensuring that expenditures are limited to eligible items. Independent audits by FEMA's OIG and some state audit staff provide an additional check on eligibility. When surveyed, public assistance program officials at FEMA's regional offices recommended limiting the time period and number of appeals for building restoration, eliminating the eligibility of facilities owned by redevelopment agencies, and restricting eligible public facilities to only those being actively used for public purposes.

US General Accounting Office (GAO). (1996). *Disaster Assistance: Improvements Needed in Determining Eligibility for Public Assistance*. Report to the Chairman, Subcommittee on VA, HUD and Independent Agencies, Committee on Appropriations, US Senate. Washington, DC: GAO.
Keywords:
public assistance, agency operations and management
Abstract: In this report, GAO reviews FEMA's criteria for determining eligibility for public assistance, determines how FEMA ensures that public assistance funds are expended only for eligible items, and identifies changes in eligibility that could lower the costs of public assistance in the future. GAO reports that FEMA's criteria for determining public assistance are ambiguous and that FEMA has systematically updated or disseminated to regional officials its policy changes affecting eligibility. FEMA relies principally on states to ensure that expenditures are limited to eligible items. Program officials in FEMA's ten regional offices identified a variety of options that, if implemented, could reduce the cost of the public assistance program, including placing limits on the appeals process; eliminating eligibility for some facilities that generate revenue, lack required insurance, or do not deliver government services; and limiting the impact of codes and standards.

US General Accounting Office (GAO). (1998). *Disaster Assistance: Information on Federal Disaster Mitigation Efforts.* Testimony before the Subcommittee on Water Resources and Environment, Committee on Transportation and Infrastructure, House of Representatives. Washington, DC: GAO.
Keywords:
enforcement, mitigation, risk assessment, federal programs
Abstract: This testimony briefly discusses why state and local governments and individuals do not always undertake disaster mitigation efforts. Reasons include local sensitivity to measures such as building codes enforcement and land-use planning, conflict between mitigation and developmental goals, and individuals' perceptions that a disaster has a low possibility of occurring. FEMA's efforts to encourage mitigation include grants and training for state and local governments, funding for mitigating damage to public facilities and purchasing and converting flood-prone properties to open space, federal flood insurance, and programs targeted at reducing

the loss of life and property from earthquakes and fires. The effort for ensuring the cost-effective use of federal dollars for hazard mitigation is hampered by the need for better data to estimate risks and by the fact that funds for hazard mitigation are provided through a number of different programs and agencies—some limited to particular hazards. However, savings from such programs depends upon the incidence of future disasters and the extent to which the federal government would bear the resulting losses.

US General Accounting Office (GAO). (1999). ***Disaster Assistance: FEMA Can Improve its Cost-Effectiveness Determination for Mitigation Grants*****. Testimony before the Subcommittee on Oversight, Investigations, and Emergency Management, Committee on Transportation and Infrastructure, House of Representatives. Washington, DC: GAO.**
Keywords:
cost-benefit analysis, mitigation, Hazard Mitigation Grant Program
Abstract: This statement describes the approaches FEMA and the states use to ensure that the Hazard Mitigation Grant Program's awards are targeted to cost-effective mitigation projects. It presents the GAO's findings as to whether the approaches ensure that the mitigation measures are cost-effective. GAO found that not all the states conducted cost-benefit analyses to determine projects' cost-effectiveness. Although FEMA does use cost-benefit analysis as its primary approach for ensuring cost-effectiveness, it also exempts certain types of projects from this analysis because of difficulties in quantifying their benefits and the time needed to gather data for conducting the analyses. GAO determined that the hazard mitigation projects receiving the majority of the funding are cost effective. However, projects receiving one-third of the funding were exempt from cost-benefit analysis, despite the absence of the established analytical basis supporting the exemption of a majority of these projects.

US General Accounting Office (GAO). (1999). ***Disaster Assistance: Opportunities to Improve Cost-Effectiveness Determinations for Mitigation Grants*****. Report to Congressional Committees. Washington, DC: GAO.**
Keywords:
Hazard Mitigation Grant Program, mitigation, cost-benefit analysis
Abstract: GAO reviewed how FEMA, together with individual states, ensures the cost-effectiveness of projects under the mitigation grant program. GAO found that the states and FEMA work together to help ensure that program grants are awarded for cost-effective projects. The states, according to GAO's review, established procedures and priorities for identifying and selecting mitigation projects, but not all of them conducted a formal analysis of a project's cost-effectiveness before submitting an application for the project to FEMA.

US General Accounting Office (GAO). (1999). ***Flood Insurance: Information on Financial Aspects of the National Flood Insurance Program.*** **Testimony before the Subcommittee on Housing and Community Opportunity, Committee on Banking and Financial Services, House of Representatives. Washington, DC: GAO.**
NOTE: GAO gave similar testimony before the Committee on Banking, Housing, and Urban Affairs, US Senate, in August 1999. This testimony appears in a separate GAO document not cited in the bibliography.
Keywords:
insurance premiums, liability, NFIP, subsidies

Abstract: In this testimony, GAO discusses the factors contributing to financial difficulties of the NFIP as of 1998 and the potential effects of corrective actions by FIA. A GAO report from March 1994 found that NFIP funds were sufficient to cover current program expenses but were susceptible to future flood losses. Between 1993 and 1998, claims increased as a result of losses from a series of storms, including the 1997 floods in the Red River Valley. Program losses totaled $1.6 billion. To cover this cost, FIA borrowed funds from the US Treasury and owes $738 million as of March 31, 1999. The GAO report finds several reasons for the deficit. Dependence on premiums for funding prevents the NFIP from anticipating the cost of future losses. Repetitive loss properties account for claims disproportionate to their number or premiums. Annual premiums on subsidized policies, though nearly twice the annual premiums on actuarial policies, represent only 38 percent of the true risk premium of the policy. FIA aims to collect sufficient revenue to meet the expected losses and expenses of the average historical loss year, as well as cover the program administration. However, the calculation of the average historical loss year is based only on experience under the program since 1978. To address the financial health of the NFIP, FIA has studies underway to assess the potential effects of eliminating subsidized properties and targeting the repetitive loss properties that pose the greatest cost. The report recognizes that losses experienced by the program have gradually declined since fiscal year 1995 and that financial status is an imperfect indicator of the value of the program. Standards for new construction reduce the potential cost of future losses and subsidized premiums encourage program enrollment, decreasing taxpayer-funded disaster relief.

US General Accounting Office (GAO). (1999). ***Food and Drug Administration Facility: Requirements for Building on a Floodplain Met.*** **Report to Congressional Requester. Washington, DC: GAO.**
Keywords:
federal programs, Maryland
Abstract: This report is in response to a request for information about a new facility for the Food and Drug Administration in College Park, MD, located in a floodplain. The report found that the facility met the minimum requirements set by the state of Maryland for a building with a basement in a flood plain. The total cost of the building and land is estimated to be about $86 million. The basement contains the building's main computer facilities, which stores for the Center for Food Safety and Applied Nutrition. Flooding of the computer facility would result in damages close to $4 million.

US General Accounting Office (GAO). (1999). ***Tennessee Valley Authority: Future Study of Lake Levels Should Involve Public and Consider Costs and Benefits.*** **Report to the Honorable Van Hilleary, House of Representatives. Washington, DC: GAO.**
Keywords:
cost-benefit analysis, Tennessee Valley Authority, dams, strategic planning, agency operations and management
Abstract: The Tennessee Valley Authority (TVA), a government corporation, has harnessed the Tennessee River and its tributaries to serve various purposes from recreation to flood control to hydroelectric power production. Thirteen of TVA's projects along the river, known as multipurpose tributary projects, consist of dams and lakes on the river's tributaries, such as the Douglas and Cherokee projects and provide multiple public benefits. In operating its integrated system, TVA often finds that the multiple purposes served by the project can conflict and/or

compete with each other. This report discusses: (a) the purposes served by TVA's multipurpose tributary projects and how TVA operates them within its integrated system; (b) the operational changes TVA made to these projects as a result of its December 1990 review of its project operations and the major factors influencing these changes; (c) the steps TVA has taken since 1990 to address requests for changes in the way it operates these projects; and (d) TVA's plans for future changes in the way it operates these projects.

US General Accounting Office (GAO). (2000). *Disaster Assistance: Issues Related to the Development of FEMA's Insurance Requirements.* Report to Congressional Committees. Washington, DC: GAO.

Keywords:

public assistance, agency operations and management, disaster assistance

Abstract: FEMA has proposed that funding under the Public Assistance Program for buildings damaged in a disaster be limited to those state and local agencies and other public entities that maintain specified minimum levels of insurance coverage. According to FEMA, the draft regulation is intended to remove a disincentive under current rules for such entities to both carry insurance and manage their risk of disasters. This report evaluates the agency's efforts to develop its draft insurance regulations. GAO (1) determines the extent to which FEMA obtained and incorporated input for state and local agencies and public entities likely to be affected by the draft regulation; (2) evaluates FEMA's compliance with Executive Order 12866, the Regulatory Flexibility Act, and applicable guidance governing the rulemaking process; and (3) assesses FEMA's internal rulemaking processes and procedures. Based on its review, GAO found that FEMA took a number of steps to obtain and incorporate input on the content of its draft and, based on this input, made changes to its draft regulation, but the agency failed to fully comply with Executive Order 12866 because it had not performed an analysis of the expected costs and benefits of the draft regulation and had not prepared a comprehensive analysis of other alternatives. Many of problems observed by GAO appeared to come from weaknesses in FEMA's internal rulemaking processes and procedures. For example, FEMA had not designated a regulatory policy officer and had not updated its internal guidance and procedures governing the formulation of proposed rulemaking in more than ten years.

US General Accounting Office (GAO). (2001). *Disaster Assistance: Improvement Needed in Disaster Declaration Criteria and Eligibility Assurance Procedures*. Report to the Subcommittee on VA, HUD, and Independent Agencies, Committee on Appropriations, US Senate. Washington, DC, GAO.

Keywords:

disaster assistance, public assistance

Abstract: The report analyzes FEMA's criteria for determining eligibility for disaster assistance, and the effect of implementation of changes in eligibility requirements. Since 1990 FEMA has expended over $27 billion in disaster assistance. Federal funds for disaster assistance are provided on the basis of whether costs exceed a fixed cost per capita statewide. The report finds that these criteria are not indicative of a state's financial capacity to respond to a disaster, merely the impact of the disaster in relation to population. Also, while FEMA has continued to develop clear criteria for determining the eligibility of individual projects, difficulties in applying these criteria persist because of the temporary nature of many of the field staff and the lack of sufficient training. FEMA has delayed implementing a credentialing program because of

budgetary and programmatic factors. The lack of centralized, quantified, reliable data also hampers the ability of FEMA officials to conduct program-wide analysis of the public assistance program.

US General Accounting Office (GAO). (2001). ***FEMA: Status of Achieving Key Outcomes and Addressing Major Management Challenges*****. Report to the Ranking Minority Member, Committee on Governmental Affairs, US Senate. Washington, DC. GAO.**
Keywords:
disaster assistance, disaster planning, mitigation, strategic planning, agency operations and managment
Abstract: FEMA's performance in achieving key outcomes in fiscal year 2000 was analyzed as required by the Government Performance and Results Act of 1993. The report finds continued improvement in the selected key outcomes: to minimize human suffering and property losses after natural disasters, provide timely responses to disaster aid requests, and prevent or reduce harm and losses from future disaster through mitigation efforts. The report concludes that the performance goals that FEMA uses to measure progress in these three areas are largely accurate and effective in encouraging program improvement. The report also reviews FEMA's projected handling of strategic human capital management and information security through its 2002 performance plan.

US General Accounting Office (GAO). (2001). ***Flood Insurance: Emerging Opportunity to Better Measure Certain Results of the National Flood Insurance Program*****. Testimony before the Subcommittee on VA, HUD, and Independent Agencies, Committee on Appropriations, US Senate. Washington, DC: GAO.**
Keywords:
Special Flood Hazard Areas, compliance, mapping, strategic planning, agency operations and management
Abstract: In this prepared statement, GAO specifically addresses whether FEMA could better evaluate the NFIP's results by adding a goal tied to rates of participation in the program—the percentage of structures in SFHAs that have insurance; and what obstacles and opportunities exist for measuring these participation rates. While FEMA does have several performance goals used to evaluate the NFIP's effectiveness, the agency does not assess participation rates of residents living in flood-prone areas. By collecting data on the number of insured and uninsured structures in flood-prone areas, FEMA could assess how effectively the program penetrates areas at risk for flood damage and could better target its marketing efforts. However, before participation rates can be used to measure the success of the NFIP, better data are needed on the total number of structures in flood-prone areas. Currently, data on the number of structures are incomplete and inaccurate. GAO notes that FEMA is working to improve the quality of these data with the use of, for example, new mapping technologies.

US General Accounting Office (GAO). (2001). ***Flood Insurance: Information on the Financial Condition of the National Flood Insurance Program*****. Testimony before the Subcommittee on Housing and Community Opportunity, Committee on Financial Services, House of Representatives. Washington, DC: GAO.**
Keywords:
NFIP, insurance premiums, repetitive losses, subsidies

Abstract: In this prepared statement, GAO addresses three issues: (1) the financial results of the program's operations since FY 1993, (2) the program's actuarial soundness, and (3) the impact of repetitive loss properties and FEMA's strategies for reducing those losses. GAO reports that the NFIP operated "in the black" for past two fiscal years, which enabled the program to repay funds it had borrowed from the US Treasury to finance earlier losses. With regards to actuarial soundness, the report finds the NFIP does not collect sufficient premium to build reserves to meet future expected flood losses. As of 2000, approximately 30 percent of policies received subsidized rates. Furthermore, repetitive loss properties have a major disproportionate impact on the program, currently accounting for about $200 million in losses annually. Based on its findings, GAO presents policies FIA could adopt to correct programmatic deficiencies. For example, the NFIP could achieve actuarial soundness through a rate-setting process that would to consider the monetary risk exposure of the program or the dollar value of expected flood losses over the long run. In addition, GAO also supports FIA's efforts to identify target repetitive loss properties and transfer their servicing to a special facility designed to better oversee claims and coordinate and facilitate insurance and mitigation actions and to develop and implement proposals to reduce the subsidy provided to pre-FIRM repetitive loss properties.

US General Accounting Office (GAO). (2002). ***Flood Insurance: Extent of Noncompliance with Purchase Requirements is Unknown*****. Report to Congressional Committees. Washington, DC: GAO.**

Keywords:
mandatory purchase, lending institutions

Abstract: This report presents the opposing perspectives held by bank regulators and government-sponsored enterprises (GSEs) and FEMA regarding lender compliance with flood insurance purchase requirements. Federal agencies responsible for overseeing lenders have uncovered few significant violations of lender noncompliance in their reviews of loan portfolios. Meanwhile, FEMA suspects significant lender noncompliance rates based on data, past studies, and anecdotal evidence. GAO obtained and analyzed 1999 data on new loans and new flood insurance policies for 471 highly flood-prone areas in 17 states. The data do not indicate a major noncompliance problem at loan origination. For example, only 9 percent of the locations included in the study revealed a higher number of mortgages originated than flood insurance policies sold. According to GAO, a full measure of compliance would require property-specific data on mortgages, flood zone determinations, and flood insurance polices compiled at loan origination and at subsequent points during the life of the loan. However, several technical and political challenges encumber the achievement of such a measure.

US General Accounting Office (GAO). (2002). ***Hazard Mitigation: Proposed Changes to FEMA's Multihazard Mitigation Programs Present Challenges*****. Report to the Chairman, Subcommittee on International Security, Proliferation, and Federal Services, Committee on Governmental Affairs, US Senate. Washington, DC: GAO.**

Keywords:
Hazard Mitigation Grant Program, Project Impact, mitigation, federal programs

Abstract: As the lead agency for providing federal disaster relief, FEMA has provided the bulk of the assistance to help those in need respond to and recover from disasters. The most significant of the agency's mitigation programs are the postdisaster Hazard Mitigation Grant Program (HMGP) and Project Impact. Some criticism has emerged in recent years about the

impact of these FEMA programs. In response, FEMA's FY 2003 budget request proposes changes to the multihazard mitigation programs that are intended to improve the effectiveness of mitigation efforts. These changes would combine the programs into a single predisaster mitigation program that awards grants for mitigation activities on a nationwide, competitive basis. Based on its analysis, GAO raises the following concerns about the proposal: (1) FEMA might not be able to take advantage of interest in participating in mitigation activities that often emerges after a disaster, (2) some states might be entirely excluded from mitigation funding, (3) outreach and planning activities that help increase participation in mitigation might be curtailed, and (4) FEMA might face challenges, such as establishing a process for comparing the costs and benefits of projects, in implementing the new program. Furthermore, some people are concerned that heightened focus on homeland security will result in less focus on natural hazard mitigation activities.

US General Accounting Office (GAO). (2002). ***Results-Oriented Management: Agency Crosscutting Actions and Plans in Border Control, Flood Mitigation and Insurance, Wetlands, and Wildland Fire Management.*** **Report to the Ranking Minority Member, Committee on Governmental Affairs, US Senate. Washington, DC: GAO.**
Keywords:
NFIP, mitigation, insurance, strategic planning, federal programs
Abstract: GAO reviewed the FY 2001 performance reports and the FY 2003 performance plans of two agencies—Agriculture and FEMA—both of which generally address coordination efforts regarding the issue of flood mitigation. Agriculture reported that it did not meet its only FY 2001 goal related to flood mitigation—providing benefits to property and safety through flood damage reduction by completing 81 watershed protection structures. One reason cited for this failure involves the complex engineering required to complete such structures. FEMA reported meeting all but one of its FY 2001 goals and indicators related to flood mitigation and insurance. FEMA did not increase the number of NFIP policies in force by 5 percent in FY 2001 because retention rates for existing policies were not maintained. In its FY 2003 plan, FEMA adopted a new goal related to modernizing its floodplain mapping. Agriculture appears to have dropped its target for completing new watershed protection structures and instead plans to implement a new program of rehabilitating aging dams. Overall, the strategies Agriculture and FEMA plan to use appear to be reasonably linked to achieving their FY 2003 goals.

US General Accounting Office (GAO). (2003). ***Flood Insurance: Challenges Facing the National Flood Insurance Program*****. Testimony before the Subcommittee on Housing and Community Opportunity, Committee on Financial Services, House of Representatives. Washington, DC: GAO.**
Keywords:
NFIP, subsidies, repetitive losses, mandatory purchase, mapping
Abstract: In this report, the GAO finds the NFIP faces several challenges in operating the program effectively and protecting property owners from flood losses. For example, to improve information on the NFIP's financial condition, the GAO recommends the program abandon its current cash-based budgeting and adopt accrual-based budgeting. Accrual-based budgeting better matches revenues and expenses, recognizes the risk assumed by the government, and has the potential to overcome the deficiencies of cash-based budgeting. The GAO also comments on how policy subsidies and repetitive loss properties adversely affect the NFIP's financial

condition. About 29 percent of policies in force receive subsidies but none of these subsidies receives appropriated funds. Further, repetitive loss properties account for 2 percent of insured properties but represent 38 percent of claims losses. Finally, the NFIP needs to increase property owner participation rates. The administration estimates less than 50 percent of eligible properties participate in the program. Increasing participation rates may pose difficulties because the recent placement of the NFIP within the Department of Homeland Security has the potential to decrease the attention, visibility, and support the program receives.

US General Accounting Office (GAO). (2003). ***Major Management Challenges and Program Risks: Federal Emergency Management Agency*****. Performance and Accountability Series. Washington, DC: GAO.**

Keywords:
NFIP, mitigation, insurance, Hazard Mitigation Grant Program, Project Impact, mandatory purchase, federal programs

Abstract: This report is part of a special GAO series entitled the *Performance And Accountability Series: Major Management Challenges and Program Risks*. The 2003 series includes the first report on FEMA since the series began in 1999. FEMA's mission will be absorbed into the Department of Homeland Security. As FEMA moves to integrate its mission into this department, the agency faces several management challenges including the condition of its mitigation and flood insurance programs. Specifically, GAO reports on FEMA's FY 2003 budget request, which proposes a consolidation of the Hazard Mitigation Grant Program (HMGP) and the former Project Impact. The proposed consolidation could raise additional challenges to participation in and implementation of the mitigation program. Concerning flood insurance, GAO notes the actuarial unsoundness of the NFIP and the program's failure to collect sufficient premium income to build reserves to meet the long-term future expected flood losses. In addition to these concerns, the level of compliance with the requirements for the mandatory purchase of flood insurance is unknown. Nevertheless, GAO believes FEMA can reduce the impact of natural hazards by improving the efficiency of its mitigation and flood programs.

US Senate Bipartisan Task Force on Funding Disaster Relief (1995). ***Final Report of Senate Bipartisan Task Force on Funding Disaster Relief.*** **Washington, DC. Government Printing Office.**

Keywords:
disaster assistance, federal programs, history, insurance industry, public assistance

Abstract: This report chronicles the history of federal disaster relief and recovery funding and evaluates the types and amounts of federal financial assistance provided to individuals, state and local governments, and nonprofit organizations. The report contains comprehensive calculations of federal expenditures for disaster assistance, low interest loans to individual disaster victims and communities, and federal disaster insurance programs between 1977 and 1993. The report also discusses nonfederal entities – state and local governments, private insurance companies, and nonprofit disaster relief agencies – and their role in disaster relief. Particular attention in the historical analysis is given to the dual challenges produced by exceptionally severe catastrophes in the early 1990s and constraints of the Budget Enforcement Act of 1990, which has intensified debate over disaster-related appropriations. The report outlines three means for meeting budgetary constraints. The first is making more assistance contingent on a presidential declaration of an emergency or major disaster. To accomplish this, the criteria and informational

sources for such a declaration must be defined better. Second, the NFIP should emphasize hazard mitigation with incentives for cooperation with private entities. The third approach is to rely more heavily on insurance to "prefund" disasters. The report includes appendices on the evolution of federal disaster assistance policies and programs and profiles of major federal disaster assistance programs.

US Senate, Committee on Banking and Currency. (1966). ***Insurance and Other Programs for Financial Assistance to Flood Victims.*** **Washington, DC: Government Printing Office.**
NOTE: This report reproduces "A Report from the Secretary of the Department of Housing and Urban Development to the President, as required by the Southeast Hurricane Disaster Relief Act of 1965 (P.L. 89-339), 89th Congress, H.R. 11539, November 8, 1965.
Keywords:
history, insurance, legislation, NFIP, public policy
Abstract: In response to a directive of the Hurricane Disaster Relief Act of 1965, a report was compiled to address the need to provide flood insurance or other assistance following floods and other natural disasters. This report describes specific characteristics of floods that require consideration for any proposed program. The report finds that floods are identifiable by specified local areas but unpredictable in terms of timing and magnitude and ultimately inevitable. Any potential flood insurance program should consist of basic elements including accurate assessment of risks, compensation of risk bearers, subsidy of premiums, if publicly desirable, incentives to policyholders to reduce risks, incentives to states and local governments for wise management of flood-prone areas, and continuous appraisals. The four program administrative options include a wholly private system, a private industry program with major federal help, a private industry operating government program, and an all-federal program. Final recommendations of the committee include the establishment of a national flood insurance program with "government assistance or participation to the extent necessary to assure a workable method of pooling risks, minimizing costs and distributing burdens equally among the property-owners protected by such insurance and the general taxpayers" in cooperation with state and local governments and private industry. Furthermore, the report recommends modification of the existing federal flood program to meet the necessary elements reviewed by the committee.

US Small Business Administration (SBA). (1998). ***Audit of Declined Disaster Loans.*** **Washington, DC: Office of Inspector General, SBA.**
Keywords:
Small Business Administration, disaster assistance
Abstract: SBA's Inspector General (IG) audited declined applications for disaster loans to determine whether the decline rate was higher than necessary due to inappropriate decline decisions. The audit reviewed a random sample of 97 disaster loan applications declined between October 1, 1994, and September 30, 1995. Decisions to decline loan applications were generally appropriate. SBA's IG identified only one of 97 declined applications that could have received approval. SBA declined the application because the loan officer decided that available cash was insufficient to service the additional debt. A higher than necessary decline rate occurred because SBA did not consistently apply summary decline procedure to applications that did not meet minimum income and/or repayment ability criteria. Of the 97 declined applications in the sample, SBA could have summarily declined 16 of them without processing. If SBA followed summary decline procedures consistently, the number of applications accepted for processing

would have decreased, thereby reducing the decline rate and increasing the percentage of approved applications. Furthermore, SBA unnecessarily incurred costs due to loss verification and increased its processing workload. When SBA summarily declines an application, the loan officer does not have to evaluate creditworthiness or perform detailed analysis on repayment ability. In addition, summary declined applications do not require visits by loss verifiers to determine the extent of property damage. The average costs to verify the loss for an application was about $121. Based on its analysis, SBA's IG recommends SBA institute procedures to ensure loan officers follow procedures for summary declines when appropriate.

US Small Business Administration (SBA). (1999). ***Audit Report: Disaster Home Loan Servicing Centers*****. Washington, DC: Office of Inspector General, SBA.**
Keywords:
Small Business Administration, disaster assistance
Abstract: SBA's Inspector General (IG) audited the agency's disaster home loan servicing centers in Birmingham, AL; El Paso, TX; New York, NY; and Santa Ana, CA. As of September 30, 1997, SBA's portfolio of disaster home loans at the servicing centers consisted of 185,417 loans valued at $3 billion, of which 12,843 loans valued at $179 million were in a past due, delinquent, or in-liquidation status. SBA's IG statistically sampled 432 of these loans valued at $4.8 million to determine whether SBA followed collection procedures or performed liquidation actions intended to minimize losses. Collections actions on past due disaster loans were untimely, not done weekly, and continued beyond recommended time limits. Although specific losses cannot be identified, SBA did not maximize collection efforts for outstanding loan balances totaling $79.2 million. Furthermore, the audit reveals that disaster home loans were charged off (i.e., no reasonable expectation that borrower will repay the loan) without litigation or collection agency referrals. SBA's IG estimates that $4.8 million charged off for 928 loans could have been potentially recoverable had the agency used various liquidation tools. Based on its analysis, SBA's IG recommends the agency improve collection actions on past due loans, conduct a study on staffing requirements, and use available collection tools to liquidate loans.

US Water Resources Council. (1981). ***Floodplain Management Handbook*****. Washington, DC: US Water Resources Council.**
Keywords:
floodplain management, flood causes, environmental impacts, environmental policy, public policy, nonstructural approaches, structural approaches
Abstract: This handbook summarizes the problem of losses from floods and suggests potential solutions. It is intended to help local officials, public interest groups, and concerned citizens to assess the problems in their area and initiate appropriate and effective management of the floodplain. The handbook treats both riverine and coastal floodplains and describes a full range of structural and nonstructural measures to reduce losses from floods and to maintain the natural values of the floodplain. The handbook provides step-by-step guidance for developing a floodplain management program and identifies the range of technical and financial assistance available for preparing and implementing such programs.

USA Today. (2000). How your dollars let others live at the beach. ***USA Today*****, July 27.**
Keywords:
beach nourishment, development, coastal areas, repetitive losses

Abstract: This editorial frames the series of articles in *USA Today* on the growth of the population on the Atlantic and Gulf Coasts, with the view that federal aid helps drive migration to these areas and taxpayers are left with increasing disaster-relief costs when the weather turns bad. Efforts to reduce subsidies have been met with stiff resistance from lawmakers representing coastal areas. The Clinton Administration's effort to eliminate disaster relief for beaches was blocked, and FEMA's effort to get Congress to stop spending money on replacing beaches and dunes was also defeated. FEMA is taking steps to stop rampant abuse of the NFIP. A bill in Congress that would limit property owners to two flood claims has little chance of passing.

Vermont Agency of Natural Resources. (1999). *Options for State Flood Control Policies and a Flood Control Program*. Waterbury, VT: Vermont General Assembly, Vermont Agency of Natural Resources, Vermont Department of Environmental Conservation, and Vermont Water Quality Division.
Keywords:
flood control, Vermont, floodplain management
Abstract: This report focuses on how Vermont should prepare for floods, prevent flood damage, and clean up after flooding has ended. The NFIP has worked well in the state as little flood damage has occurred to structures built in compliance with local floodplain regulations. However, not all Vermont communities have joined the NFIP and thus, some flood-prone areas do not have flood insurance coverage. The program does well with mapping flood-prone areas adjacent to larger rivers and streams, but it insufficiently accounts for flooding in smaller tributaries and flooding that results from the formation of ice or debris jams. The report recommends a more aggressive application of the FEMA's 1995 mitigation policy that provides federal funding for building more expensive, but properly designed, replacements for inadequate structures (e.g., undersized culverts, etc.) lost or damaged during floods.

Vermont Department of Housing and Community Affairs. (1998). *Community Planning for Flood Hazards*. Montpelier, VT: Vermont Department of Housing & Community Affairs.
Keywords:
Vermont, floodplain management, compliance, enforcement, Community Rating System, disaster assistance, NFIP, mapping, environmental impacts
Abstract: Over the past decade flood damage costs have risen dramatically in Vermont, due to the increasing occurrences of flooding. From 1989 to 1997, FEMA allocated over $20 million, administered by the Department of Housing and Community Affairs (DHCA), for assistance to repair public works in Vermont's municipalities. Recently, a majority of flood damage in the state has occurred along upland streams, damaging private property and infrastructure such as bridges, roads, and culverts. Furthermore, DHCA's responsibility for assisting municipalities in making responsible land-use decisions depends on an understanding of flood hazards, mapping, mitigation, and management. This guide presents information on flooding and floodplains in Vermont, the NFIP, disaster assistance, mapping, CRS, state and local regulations, and potential impacts of weather and climate change.

Wachtendorf, Tricia. (2000). When disasters defy borders: What we can learn from the Red River flood about transnational disasters. *Australian Journal of Emergency Management,* 15(3) 36-41.
Keywords:

Minnesota, North Dakota, Manitoba, Canada, Red River, federal programs, public policy
Abstract: The 1997 Red River Basin flood resulted in catastrophic damages to residential, commercial, industrial, agricultural, and public properties in large portions of the basin in Minnesota, North Dakota, and Manitoba. This article examines the interaction between American and Canadian organizations during and after the flood. The author conducted in-depth interviews with 62 key government officials and non-governmental representatives from principle organizations on both sides of the border and attended several flood-related public meetings in Manitoba and North Dakota. Selected recommendations (among several others) for transnational interaction in the Red River Basin include: (1) organizations in each country must be able to maintain the ability to make decisions and take responsibility for actions taken within their own jurisdictions, (2) organizations should be given support and encouraged to integrate new technologies into their cross-border emergency communications procedures and trained to maximize the benefits of these resources, and (3) private and public sector organizations should discuss ways their skills might be transferable across the border in an emergency situation and seek opportunities where mutual aid is beneficial and appropriate.

Wahl, Richard W. (1994). The Mississippi flood. *Environment,* 36(5), 2-4.
Keywords:
floodplain management, insurance, disaster assistance, Midwest floods of 1993
Abstract: The author comments on the "The Challenge of the Mississippi Flood," by Myers and White (1993) in *Environment*. He contends that unless the incentives associated with floodplain management and assistance are modified, the public is doomed to revisit expensive relief efforts as often as disasters occur. The author points out that implicit in much of Myers and White's article is that, although federal objectives should be different (more focus on nonstructural measures and restoration of wildlife habitat), federal expenditures should play a prominent role. However, if incentives are properly structured, many of these programs would not be federally funded at all. The author claims that "most of the structures and lands affected by last summer's floods are privately owned, and private insurance should be priced to cover the appropriate level of risk. Forcing the adoption of private insurance would likely spawn entirely new creative approaches to reducing risks."

Warrick, Joby. (1999). Seeking an end to a flood of claims. *National Wildlife,* 37(4), 30-4.
Keywords:
buyouts, repetitive losses, environmental restoration, relocation
Abstract: The author reports that some communities in the United States, after years of repeatedly incurring flood damages and rebuilding houses, are opting to move homeowners to higher ground. He identifies states and communities with repetitive flood-damage claims, and discusses criticisms against the NFIP. The author draws on *Higher Ground*, a study conducted by the National Wildlife Federation, to contend that restoring floodplains to their natural function helps limit the damage from future floods, while protecting water quality and creating prime space for recreation and wildlife. The author complains that "old habits are dying slowly," but argues that things are changing. For example, the Army Corps of Engineers recently broke with tradition by announcing plans to promote buyouts and restoration of wetlands.

Waterstone, Marvin. (1978). *Hazard Mitigation Behavior of Urban Flood Plain Residents.* Working Paper #35. Boulder, CO: Institute of Behavioral Science, University of Colorado.

Keywords:
Colorado, risk perception, risk communication, attitudes, awareness, urban areas
Abstract: This study reports on an examination of various characteristics of residents of flood hazard areas in an effort to determine which factors have the most significance in explaining behavior to mitigate potential hazards. The study endeavors to illuminate a two-level process thought to be relevant to the behavior of mitigation. First, analyses were conducted to determine which characteristics play the most significant role in creating an overall awareness of the flood hazard. Second, analyses identified which factors, including hazard awareness, are likely to produce mitigation. Demographic, perceptual, experiential, and knowledge parameters were examined through telephone interviews administered to 249 residents of two similar floodplains in Denver's metropolitan area. The analyses indicate that five characteristics have significant association with variation in hazard awareness: (1) prior experience with hazards; (2) previous damage from flooding; (3) respondent's age (with the younger respondents being more aware); (4) respondent's tenure at his or her present address (the longer, the more aware); and (5) the proximity of residence to the creek (the closer, the more aware). The analyses of mitigation behavior identified three major variables, which are important for motivating mitigation action. These include: (1) a general concern about the possibility of flooding, (2) knowledge that the creek had previously flooded, and (3) owning as opposed to renting a home. The analyses also generally showed that respondents who have taken action are older, have lived at their present address longer, live closer to the creek, have greater awareness of hazards, and have previous experience with hazards.

Weber, Eugene W. and Walter G. Sutton. (1965). Environmental Effects of Floodplain Regulations. ***Journal of the Hydraulics Division, Army Corps of Engineers,*** **4402(4), 59-70.**
Keywords:
building codes, environmental impacts, Tennessee Valley Authority, zoning
Abstract: This report addresses the increase in flood damages and the continued development of floodplain lands. Land-use regulations in floodplains are present in most states, but insufficient to fully address the costs of flood damage and prevent future development. Enabling legislation for local governments limits their regulatory authority to municipal boundaries, while most development occurs in unincorporated or fringe areas. The report examines the potential for zoning ordinances, subdivision regulations, building and housing codes and encroachment line statutes to regulate floodplain development. The report concludes that different land-use regulation tools are suitable for different communities and should be applied locally. State and regional authorities, such as the Tennessee Valley Authority and the Delaware River Basin Commission, can collect data and share best practice information.

West, Carol T. and David G. Lenze. (1994). Modeling the regional impact of natural disaster and recovery: A general framework and an application to Hurricane Andrew. ***International Regional Science Review,*** **17(2), 121-50.**
Keywords:
economic impacts, Florida, Hurricane Andrew, economic modeling, natural disasters
Abstract: Two common features of natural disasters are intense regional impact and the call immediately after the event to estimate the economic impact of recovery and reconstruction. The broad purpose of this paper is to help fill the gap in the regional science literature that addresses this issue. Initially, the impact estimation problem is presented conceptually. Using a general

regional model, direct disaster impacts on exogenous variables, endogenous variables, and model linkages are identified. The conceptual problem is adapted for practical application. This translation has two aspects: (a) modifying the direct impacts for a specific model (common variants from the schematic are considered) and (b) estimating those impacts from available data. One component of the latter identifies primary sources of information typically available at the time of a natural disaster and indicates how secondary data may be used to complement, cross-check, and expand those data. A second component identifies areas of no information or high uncertainty and discusses treatment of that information gap in empirical analysis. A final section applies the research to the problem of estimating the impact of Hurricane Andrew on Florida's economy.

Whipple, William J. (1969). Optimizing investment in flood control and floodplain zoning. *Water Resources Research*, 5(4), 761-6.
Keywords:
structural approaches, zoning, cost-benefit analysis
Abstract: This article compares floodplain zoning against structural flood control. The author observes that optimization of investment between these alternatives requires consideration of project-induced development (economic development that would not occur if the project were not built) and site income (the return to the owner of new construction in the floodplain net of the cost of development). According to the author, previously existing methods that do not account for damages to project-induced growth may give unduly high cost-benefit ratios. A combination of flood control and zoning is expected to be the most productive scenario.

White, Gilbert F. (1994). Decision or procrastination in floodplain management. *Water Resources Update*, 97(Autumn) 52-5.
Keywords:
federal programs, Midwest floods of 1993, mitigation, disaster assistance, insurance
Abstract: In order to avoid a repetition of the Midwest floods of 1993 or in other regions of the nation, positive action will have to be taken on at least five major issues. First, the operating policies of federal agencies must be coordinated with each other and with the integrating role on the ground of appropriate state agencies. Second, the present policies of providing federal disaster relief will need to be revised to emphasize mitigation. Third, government and private insurance against flood losses must be offered in a more coherent fashion. Fourth, the prosecution of federal and cooperative programs for management of the floodplains and watersheds must be planned upon the basis of integrated criteria and studies that take account of the natural values of wetlands and floodplains. Finally, more discerning and continuing executive and legislative audits of how well policy directives are translated into action are needed.

White, Gilbert F. (1999) Water Science and Technology: Some Lessons from the 20th Century. *Abel Wolman Memorial Lecture*. Washington, DC: National Academy of Sciences and National Research Council.
Keywords:
public policy, environmental policy, Unified National Program
Abstract: The author presents criteria that he believes would, if applied, lead to the selection of high-priority goals for achieving wise management of water resources. He states that the science and technology community needs to address systematically, and with increasing intensity, at

least four deficiencies in water and related environmental management. First, there is a need to fully recognize the complex social aims that are inherent in managing any one resource or combination of resources. While public policy is slowly coming to take account of the many social and environmental relationships, it still largely ignores some of them, particularly at the intersection of social and environmental systems. Second, the criteria used to evaluate those relationships are frequently narrow, and while measures such as flood damage reduction of the magnitude of communicable diseases are used, they do not reflect other important costs and benefits needed to guide public policy. Third, notwithstanding continued interest in comprehensive river basin planning and watershed studies, there still is no widely accepted national framework for planning and carrying out such studies in suitably delimited areas with responsible participation by representatives of a full range of concerned stakeholders, including citizens and local, state, and national agencies. Fourth, even after a century of vigorous and promising activity in the study and management of human interactions with water and other elements of the environment, the United States still lacks a program to appraise the results of such efforts rigorously in the lives of people and ecosystems. Severe problems of social organization and process stand in the way of achieving such improvements in each segment of water management. In each there is need for imaginative research to extend the limiting conditions of both organization and knowledge. The time is ripe for a unified effort.

White, Gilbert F. and E.J. Haas. (1975). ***Assessment of Research on Natural Hazards*****. Cambridge, Massachusetts: MIT Press.**
Keywords:
natural disasters, risk assessment, disaster planning
Abstract: This book focuses on natural hazards. It summarizes research on natural disasters in the United States, discusses future disasters, the nation's response to extreme geophysical events, acceptable levels of risk, adjustment choices, possible improvements, application of research, methods of estimating research results, common adjustment research themes, new research strategies, and last, hazards and their distinctive opportunities.

White House Office on Environmental Policy. (1993). ***Protecting America's Wetlands: A Fair, Flexible, and Effective Approach*****. Washington, DC: White House Office on Environmental Policy.**
Keywords:
wetlands, environmental protection, environmental restoration, federal programs
Abstract: The positions contained in this paper strongly support the effective protection and restoration of the nation's wetlands, while advocating much-needed reforms to increase the fairness and flexibility of federal regulatory programs. The Clinton Administration supports the interim goal of no overall net loss of the nation's remaining wetlands and the long-term goal of increasing the quality and quantity of the nation's resource base from wetlands. Additional principles for federal wetlands policy are proposed: (a) regulatory programs should be fair, flexible, and predictable and should be administered in a way that avoids unnecessary impacts on private property and the regulated public; (b) non-regulatory programs should be encouraged; (c) federal partnerships with state, tribal, and local governments, the private sector, and individual citizens should be expanded and should approach wetlands protection and restoration from the context of an ecosystem/watershed; and (d) federal policy on wetlands should be based on the best scientific information available.

White, W.R., ed. (1990). *International Conference on River Flood Hydraulics*. Wallingford, Oxon, UK: Hydraulics Research Limited.
Keywords:
hydrology and hydraulics, modeling, riverine areas
Abstract: This book documents the proceedings of the International Conference on River Flood Hydraulics in Wallingford, England. The purpose of the conference was to promulgate new ideas and to bring together international experts in the field. The aim of the conference was to link current experimental and analytical research to the needs of engineering practice. The topics selected for the conference covered areas of international research interest and practical importance with a view to providing a forum for advancing the art of river engineering. The major topics covered by the conference were: (a) flood analysis and prediction; (b) field data; (c) hydraulics of flood flows; (d) sediment transport and morphological effects; (e) physical and numerical modeling; and (f) engineering design, maintenance, and operation of schemes.

Wild, Richard A. (1989). Disseminating flood hazard information at the local level: An approach for the 1990s. In *Floodplain Harmony*. Boulder, CO: Natural Hazards Research and Applications Information Center, Institute of Behavioral Science, University of Colorado.
Keywords:
awareness, floodplain management, mapping, risk assessment
Abstract: This report proposes achieving community awareness-development through a state-by-state database to coordinate flood hazard information to facilitate dissemination of that information. The NFIP was created to mitigate future flood losses and to provide protection for property owners from potential losses. As a risk assessment and mapping program, the NFIP has generated and used data to develop actuarial flood insurance rates and local floodplain management programs. Technological advances in the field of computer science have facilitated the cost-effective accumulation, manipulation, and transfer of database information and the production of reports by noncomputer-literate people. An inventory of Letters of Map Amendment and Letters of Map Revision was prepared based on fill, which is an example of the type of information that could be included in the comprehensive database. The inventory was developed as FEMA investigated information that could be merged into a digital system of street addresses. In the future, additional mechanisms will be developed for identifying, compiling, and disseminating available flood-hazard-related information that will be included in the proposed comprehensive database of flood hazard information from federal, state, and local sources. At the discretion of FEMA, the databases will be compiled in the following order: (a) Letters of Map Revision not based on fill; (b) physical map revisions; and (c) flood insurance studies.

Wind, H.G., T.M. Nierop, C.J. de Blois, and J.L. de Kok. (1999). Analysis of flood damages from the 1993 and 1995 Meuse floods. *Water Resources Research,* 35(11), 3459-65.
Keywords:
Meuse River, modeling, flood damage
Abstract: This paper addresses uncertainties pertaining to damage assessments made for the flooding of the Meuse River in 1993 and 1995. The analysis is based on flood damage data that were collected by damage experts and consist of large sample sizes within each municipality. The most interesting aspect of these two floods is that although the volume of flooding and the

inundated area were comparable in order of magnitude, the flood damage estimates in 1995 were 35 percent lower than in 1993. The authors concluded that part of the reduction in flood damage during the 1995 flood was due to a reduction in the damage to household goods. This may be explained by a marginal increase in flood warning time and experiences gained from the flood of 1993. As flood damage assessments are the cornerstone in the evaluation of mitigation schemes, empirical data of previous floods should be used to improve the foundations of the methods to assess flood damages.

Wisconsin Department of Natural Resources, Bureau of Water Regulation and Zoning. (1983). *Effectiveness Study of Wisconsin's Floodplain Management Program, Final Report*. Madison, WI: Wisconsin Department of Natural Resources.
Keywords:
floodplain management, Wisconsin
Abstract: This report analyzes the contribution of local programs to the overall goals and objectives of Wisconsin's floodplain management programs using a community-based data system. The Wisconsin Department of Natural Resources conducts community floodplain audits to collect data onsite. Auditors perform field inspections and review zoning ordinances and program files with local program administrators. The authors conclude that program priorities ought to be expanded beyond zoning to include activities aimed at mitigating existing flood hazards prior to flood disasters. Also, local program monitoring and community assistance and education were deemed essential to the success of the program. This goal could be accomplished by more clearly defined objectives and definitions at the state level and more intensive follow-up and data collection efforts by the state agency.

Wright, James M. (1994). Coping with the flood: The next phase. *Water Resources Update*, 95(Spring), 5-10.
Keywords:
floodplain management, history, strategic planning
Abstract: This article describes the evolution of approaches to floodplain management in the United States. The evolution has come from the gradual merger of three policy streams—flood control, resources protection, and disaster assistance—and it includes a shifting of responsibility from the state and local level to the federal level. Recent accomplishments include the employment of new approaches and programs to deal with flood problems, the emergence of the NFIP as the dominant federal activity for dealing with floods, and growing public awareness. The author recommends six general areas for improvement in the future: (a) achieve a proper accounting of flood risk in decision making, (b) investigate flood loss reduction and resource protection strategies further, (c) build floodplain management capability at all government levels, (d) achieve the intent of the NFIP, (e) avoid political responses to flood disasters, and (f) employ new approaches.

Wright, James M. (2000). *The Nation's Responses to Flood Disasters: A Historical Account*. Madison, WI: Association of State Floodplain Managers.
Keywords:
history, legislation
Abstract: This report explores the forces and events that have shaped floodplain management policy and practice. It begins in the early nineteenth century, with the debates about federal

involvement in flood control and then documents the Flood Control Acts of 1917, 1928, and 1936, which demonstrate an increasing federal role in flood control. As the nation became more urbanized, the potential for flood damage increased faster than it could be controlled, and a broader approach to the problem became necessary. The Tennessee Valley Authority, Army Corps of Engineers, US Geological Survey, and several states all played roles in establishing regulations for floodplain management. In 1968 Congress established the NFIP, and with it began, among other things, national floodplain mapping, stricter land-use regulations, buyout programs, and the privatization of some flood insurance policies. In 1987 the Federal Interagency Floodplain Management Task Force initiated an assessment of the nation's program for floodplain management. The assessment was completed in 1992 with the publication of a two-volume report, *Floodplain Management in the United States: An Assessment Report*, and based on the report, the Task Force developed a revised Unified National Program for Floodplain Management in 1993 to reflect trends affecting floodplain management, and to include findings in the 1992 assessment. Many observers in the 1990s believed even more changes in national policies were necessary, as well as public awareness of the risks of living in flood-prone areas.

Yakowitz, Sidney. (1985). Markov flow models and the flood warning problem. *Water Resources Research,* 21(1), 81-8.
Keywords:
modeling, riverine areas
Abstract: Let {Yj} represent periodically sampled river discharge values. For simplicity, a flood occurs at epoch n+1 if, for some fixed *T, Y* n+1 > *T*. Assume that at epoch n, the decision maker must decide whether or not to issue a flood warning, this decision being based on the past flow record {Y j} j,< n. Finally, assume that costs have been assigned to the two types of mistakes: the "false alarm" event and the event that a flood occurs when no warning was issued. It is argued that outside the Gaussian assumption, standard time series methodology is inappropriate for the flood-warning problem. This paper relates recent progress based on alternate principles. A noparametric inference procedure is described that converges to the optimal decision function for the flood warning problem as the length of the historical record increases for any stationary G2-ergodic Markov process. Under additional assumptions, rates can be established and shown to be optimal in a certain sense. The new methodology is compared with autoregressive moving average predictors on simulated and actual river flow data.

Zhao, B. and L.W. Mays. (1996). Uncertainty and risk analyses for FEMA alluvial-fan method. *Journal of Hydraulic Engineering,* 122(6).
Keywords:
alluvial fans, Arizona, modeling, risk assessment, hundred-year flood standard, hydrology and hydraulics
Abstract: Alluvial fans along mountain bases pose quite interesting problems for the design of hydraulic structures and highway crossings and for flood insurance studies. FEMA's alluvial fan method is subject to uncertainties because it is an approximate method. In this paper, Rosenblueth's point-estimate is applied to the alluvial fan method to compute the mean and standard deviation for the 100-year discharge at any point on the fan and the mean and standard deviation for the width of the fan area. The mean and standard deviation for the 100-year discharge are used to obtain the risk that the 100-year discharge will exceed the discharge capacity of hydraulic structures on the fan. The mean and standard deviation for the width of the

fan area are used to estimate the risk that a given location on the fan will be within the hazard flood zone. The HEC-1 rainfall-runoff computer model is used to compute inputs to the FEMA method. The proposed uncertainty and risk analyses are applied to an alluvial fan in north Scottsdale, AZ.

Zimmerman, Rae. (1979). The effect of floodplain location on property values: Three towns in northeastern New Jersey. *Water Resources Bulletin*, 15(6), 1653-65.
Keywords:
New Jersey, property values, development, economic modeling
Abstract: The persistence of development and settlement in floodplains and continued damages from flooding, raises the question of how property owners respond to floodplain location and whether property values reflect this response. Existing studies disagree on the significance of flood hazard for property values. This study evaluates the effect of floodplain location on assessed valuation and home value in three towns in New Jersey. A t-test on mean assessed value and value of owner-occupied units at block levels showed no statistically significant variation for flood-prone and nonflood-prone lands. Possible explanations are that homeowners do not know or perceive the risk of living in floodplains, assessors do not incorporate flooding into assessment criteria, and flood insurance and broadened financial markets may equalize property values.

Index of Keywords